

LH156N93D SERVICE MANUAL

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POWER
CONNECTOR

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CONNECTOR

KEY&IR
CONNECTOR

LVDS
CONNECTOR

DVD-POWER
CONNECTOR

DVD
CONNECTOR

AMPLIFER
CONNECTOR

SW upgrad
CONNECTOR

HDMI

VGA

YPbPr

AV

VGA Audio In

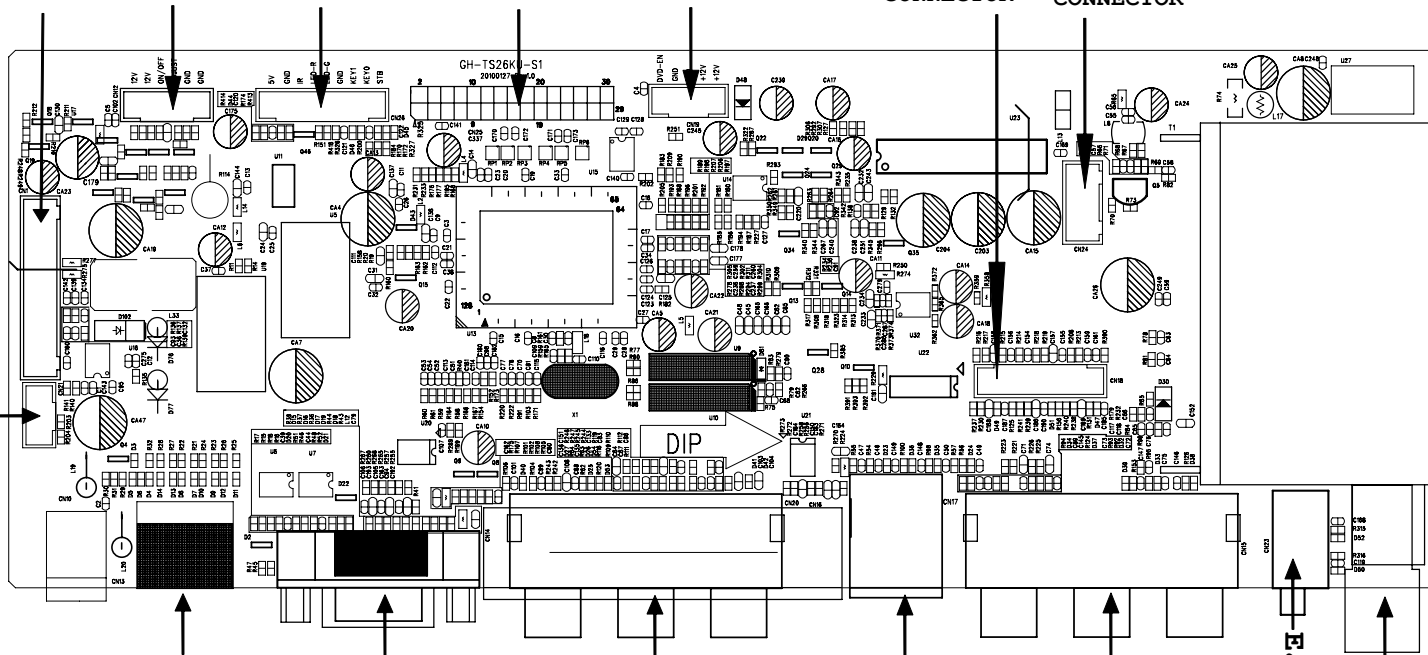
S-Video

YPbPr

AV

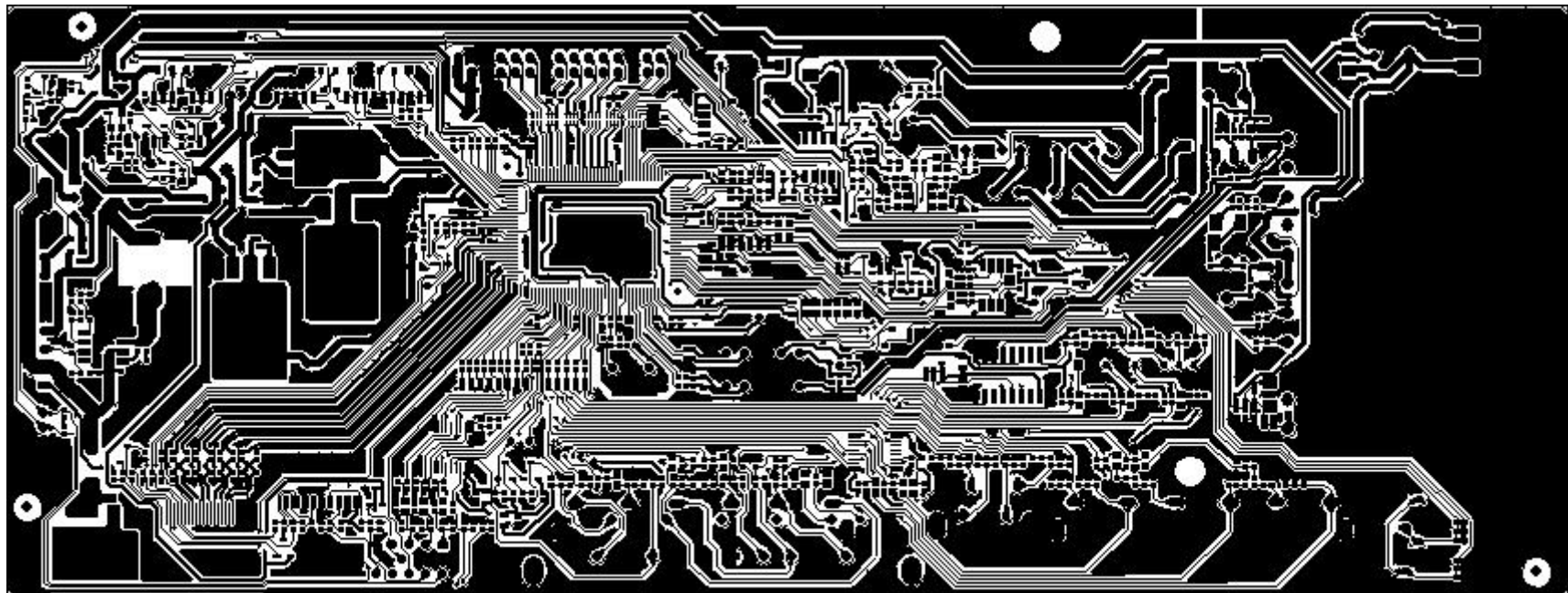
Earphone

TUNER

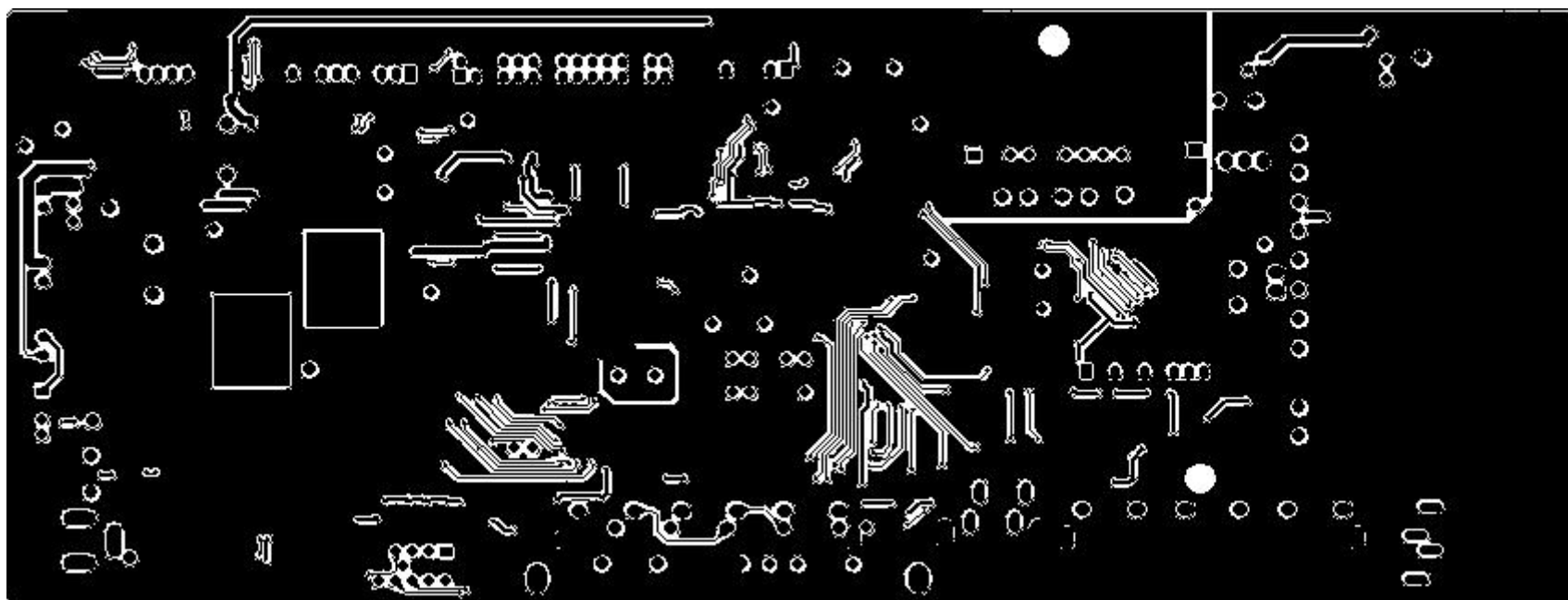


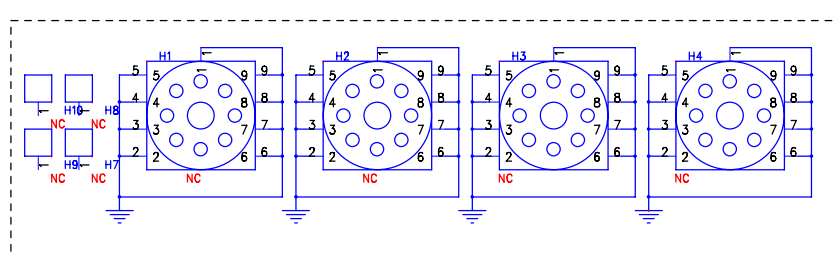
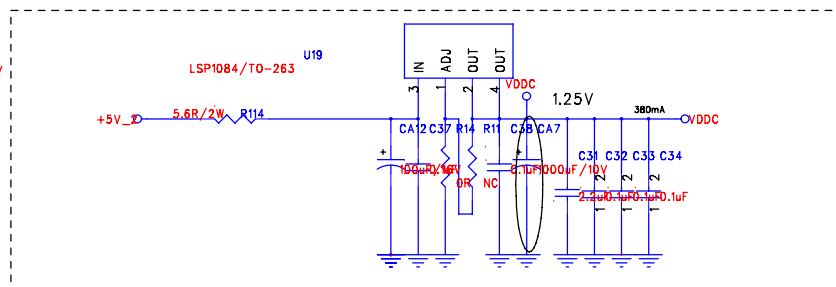
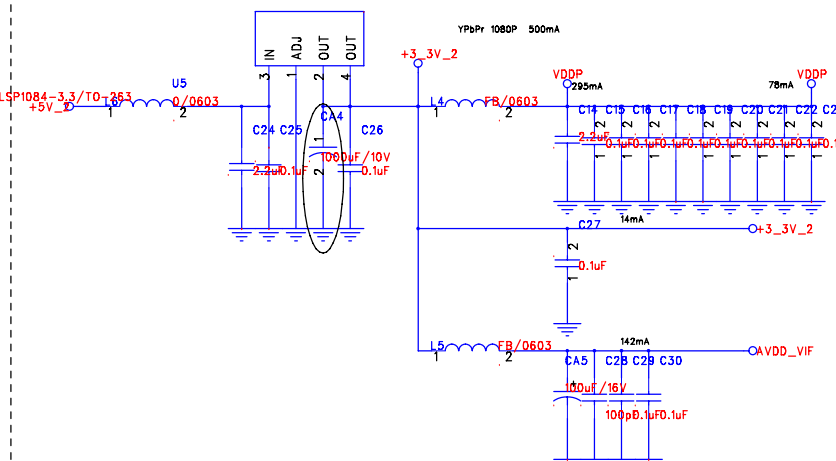
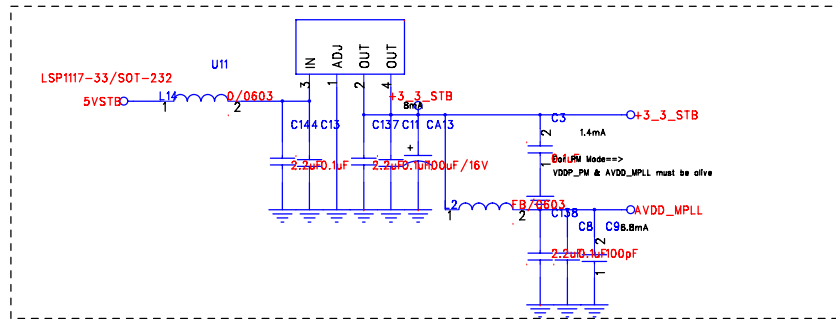
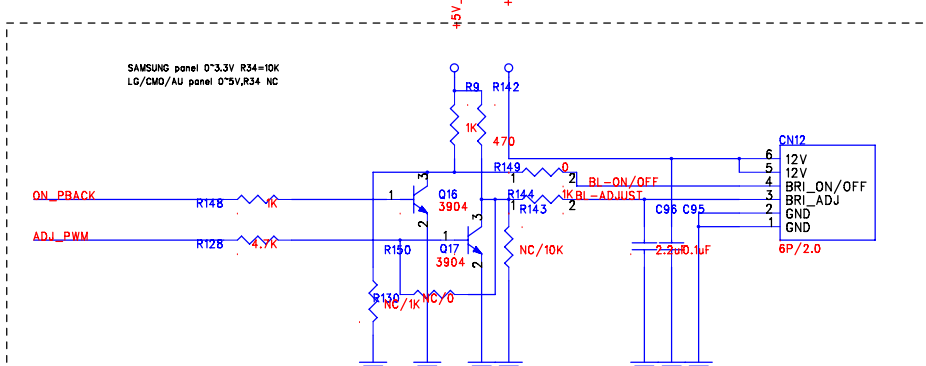
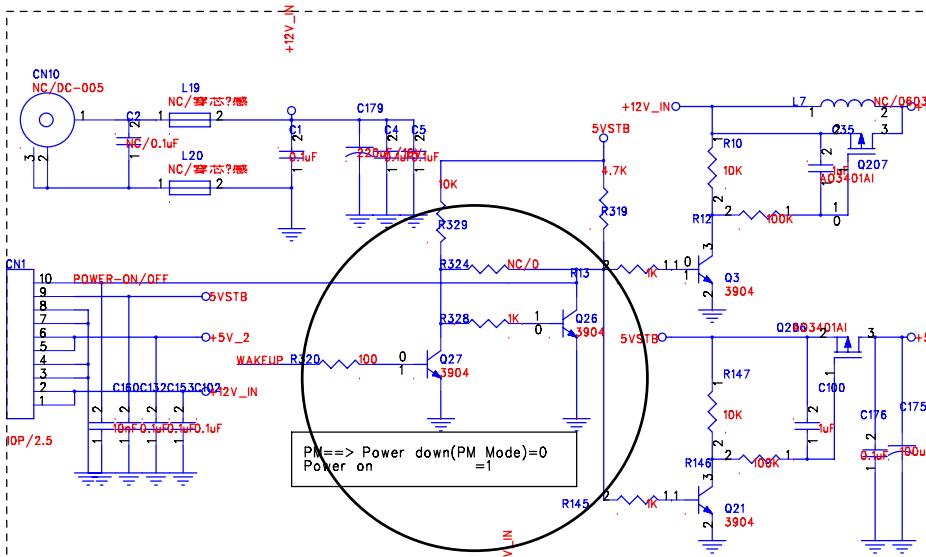
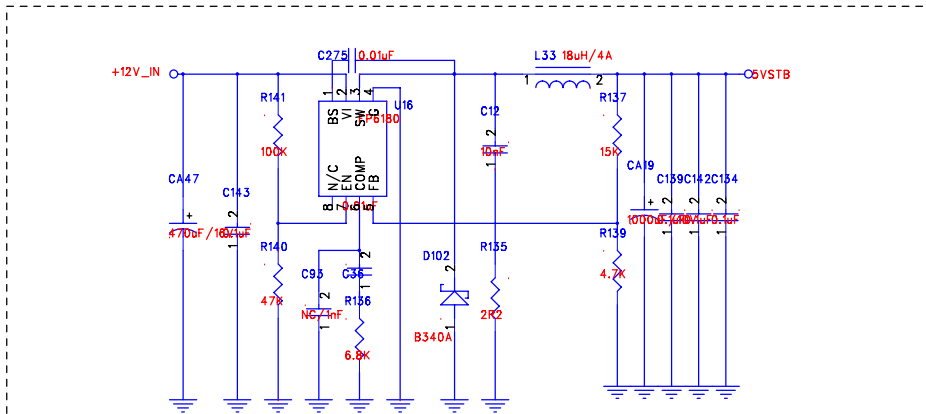
Printed Circuit

TV Main Board (Top View)

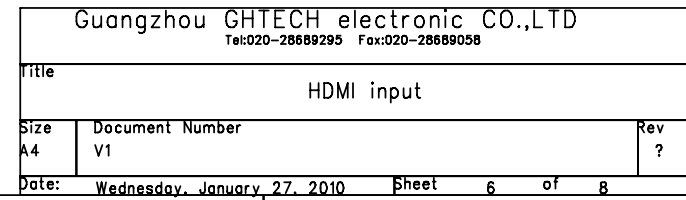


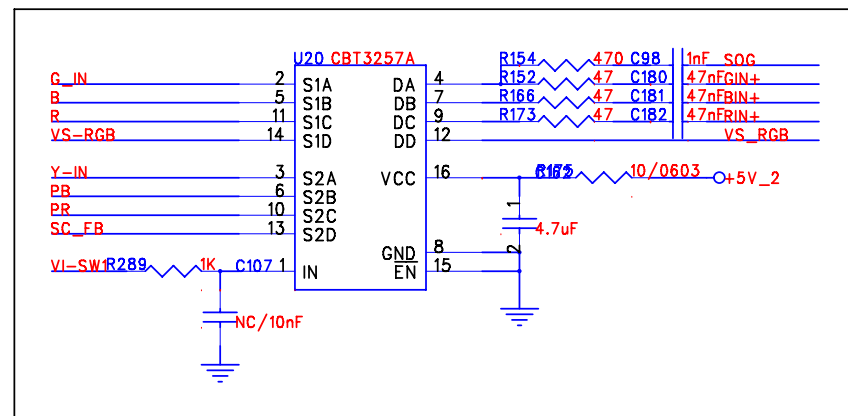
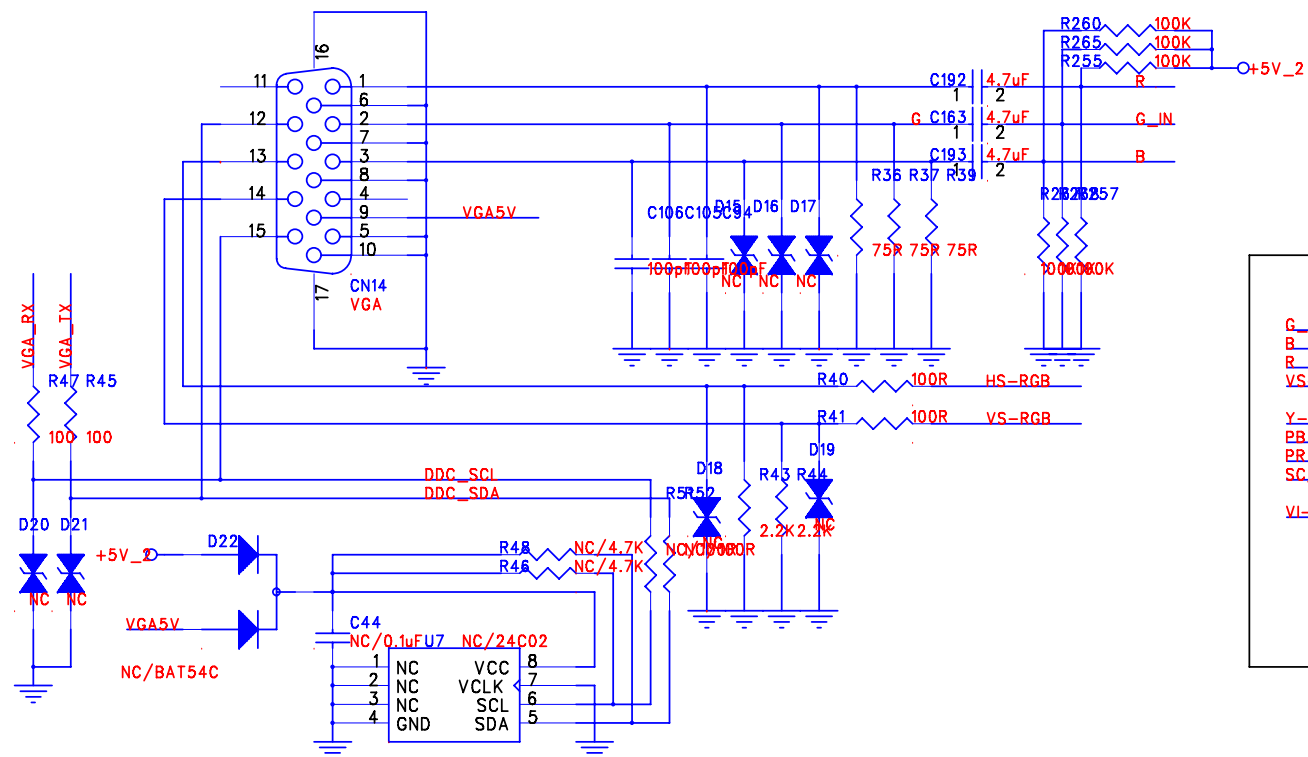
TV Main Board (Bottom view)



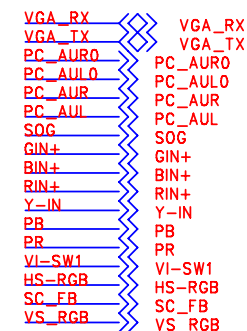
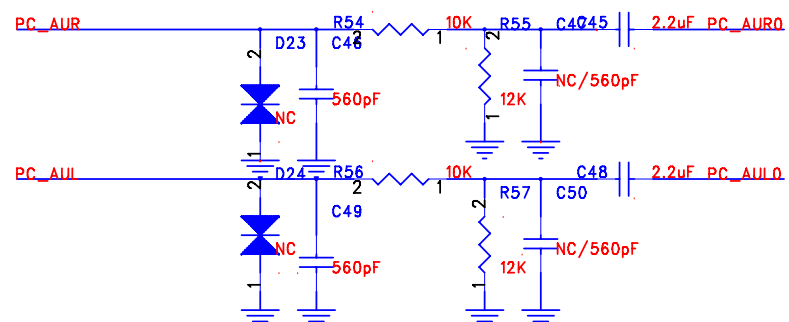


ADJ_PWM
ON_PBACK
WAKEUP



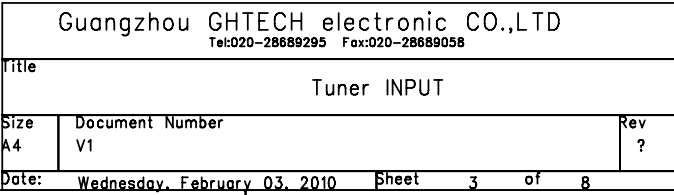


PC audio Input

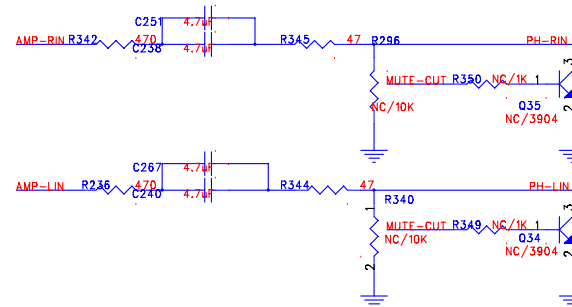
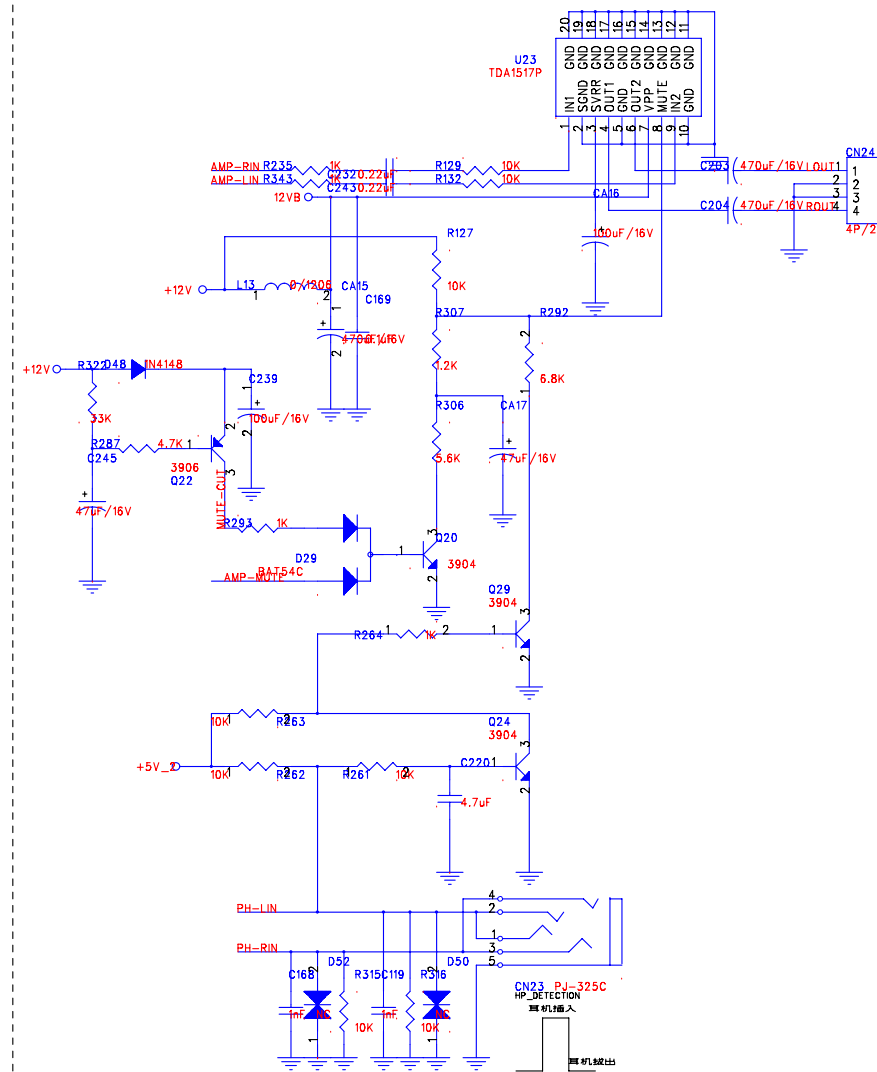
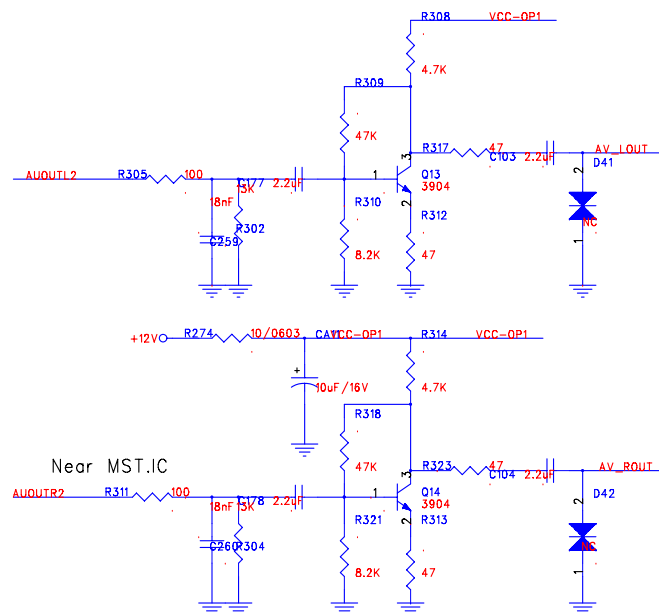
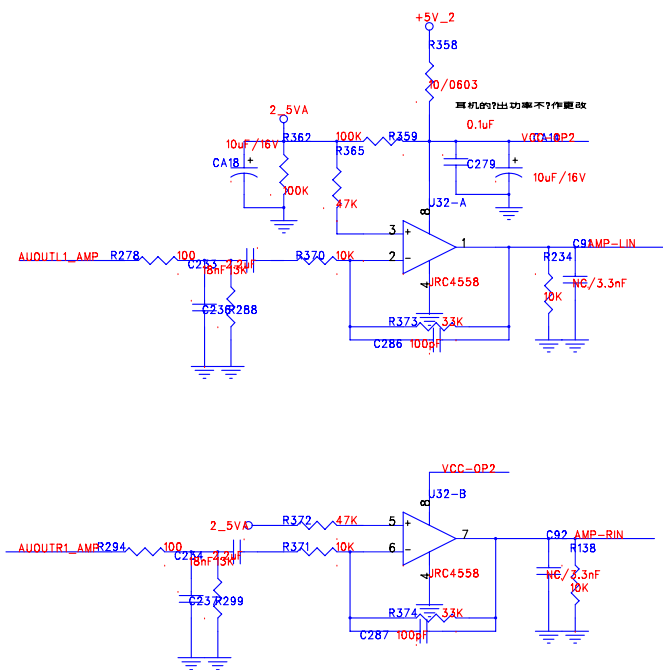


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Title		
VGA input		
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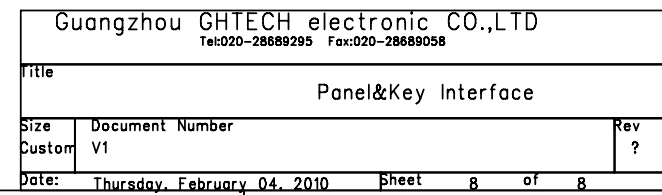
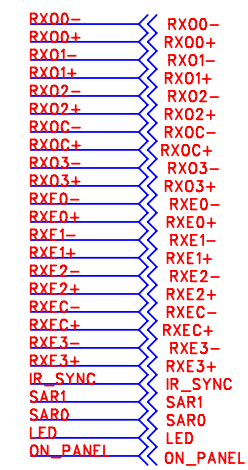


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AMP-MUTE
AV_LOUT
AV_ROUT
AUOUTR2
AUOUTL1_AMP
AUOUTR1_AMP
AUOUTL2





广州市佳熙电子有限公司BOM单

BOM编号：7. 03. 3600E0004_S

产品名称:主板

规格型号:TS36, SMT, ROHS

物料代码：7. 03. 3600E0004_S

备注：

序号	代码	物料名称	规格型号	单位	数量	工位
1	1. 01. 50220J0103R	RES LINE CHIP (贴片排阻)	22 Ω , X4, 1/16W, ±5%, 0402, SMT, ROHS	pcs	6	RP1, RP2, RP3, RP4, RP5, RP6
2	1. 01. 60000J0100R	RES CHIP(贴片电阻)	0 Ω , 1/10W, ±5%, 0603, SMT, ROHS	pcs	2	L6, L14
3	1. 01. 60000J0103R	RES CHIP(贴片电阻)	0 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	13	R14, R77, R80, R86, R88, R170, R172, R182, R196, R201, R149, R227, R232
4	1. 01. 60000J0502R	RES CHIP(贴片电阻)	0 Ω , 1/4W, ±5%, 1206, SMT, ROHS	pcs	1	L13
5	1. 01. 60100J0100R	RES CHIP(贴片电阻)	10 Ω , 1/10W, ±5%, 0603, SMT, ROHS	pcs	5	R175, R224, R229, R274, R358
6	1. 01. 60100J0103R	RES CHIP(贴片电阻)	10 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	11	R21, R22, R23, R24, R25, R26, R27, R28, R72, R78, R81
7	1. 01. 60101J0103R	RES CHIP(贴片电阻)	100 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	24	R17, R18, R19, R20, R32, R40, R41, R84, R162, R168, R169, R174, R176, R177, R180, R181, R205, R233, R202, R278, R294, R305, R311, R320
8	1. 01. 60102J0103R	RES CHIP(贴片电阻)	1K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	19	R9, R13, R29, R144, R145, R148, R212, R235, R248, R264, R289, R293, R328, R343, R385, R390, R391, R393, R71
9	1. 01. 60103J0103R	RES CHIP(贴片电阻)	10K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	40	R10, R15, R16, R54, R56, R92, R93, R95, R96, R107, R109, R111, R116, R127, R129, R132, R138, R147, R188, R193, R195, R203, R204, R208, R210, R213, R214, R215, R228, R231, R234, R249, R261, R262, R263, R315, R316, R329, R370, R371
10	1. 01. 60104J0103R	RES CHIP(贴片电阻)	100K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	31	R12, R141, R146, R158, R211, R230, R237, R238, R239, R240, R241, R242, R243, R244, R245, R246, R247, R255, R256, R257, R258, R260, R265, R267, R268, R270, R271, R272, R273, R359, R362
11	1. 01. 60105J0103R	RES CHIP(贴片电阻)	1M Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R159
12	1. 01. 60122J0103R	RES CHIP(贴片电阻)	1. 2K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R307
13	1. 01. 60123J0103R	RES CHIP(贴片电阻)	12K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	5	R85, R55, R57, R110, R112
14	1. 01. 60133J0103R	RES CHIP(贴片电阻)	13K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	5	R288, R299, R302, R304, R414
15	1. 01. 60151J0100R	RES CHIP(贴片电阻)	150 Ω , 1/10W, ±5%, 0603, SMT, ROHS	pcs	1	R65
16	1. 01. 60153J0103R	RES CHIP(贴片电阻)	15K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R137
17	1. 01. 60221J0103R	RES CHIP(贴片电阻)	220 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	2	R102, R105
18	1. 01. 60222J0103R	RES CHIP(贴片电阻)	2. 2K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	2	R43, R44
19	1. 01. 60223J0103R	RES CHIP(贴片电阻)	22K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	4	R79, R101, R163, R266
20	1. 01. 60272J0103R	RES CHIP(贴片电阻)	2. 7K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	3	R119, R197, R198
21	1. 01. 60333J0103R	RES CHIP(贴片电阻)	33K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	3	R322, R373, R374
22	1. 01. 60390J0000R	RES CHIP(贴片电阻)	39 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R70

23	1. 01. 60470J0103R	RES CHIP(贴片电阻)	47 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	19	R58, R59, R60, R91, R103, R152, R164, R166, R167, R171, R173, R220 , R222, R312, R313, R317, R323, R344, R345
24	1. 01. 60471J0103R	RES CHIP(贴片电阻)	470 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	5	R61, R142, R154, R236, R342
25	1. 01. 60472J0103R	RES CHIP(贴片电阻)	4. 7K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	17	R31, R139, R151, R160, R179, R185, R186, R194, R209, R250, R251, R308 , R314, R319, R392, R128, R287
26	1. 01. 60473J0103R	RES CHIP(贴片电阻)	47K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	5	R140, R309, R318, R365, R372
27	1. 01. 60511J0103R	RES CHIP(贴片电阻)	510 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	3	R413, R418, R68
28	1. 01. 60560J0102R	RES CHIP(贴片电阻)	56 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R69
29	1. 01. 60562J0103R	RES CHIP(贴片电阻)	5. 6K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R306
30	1. 01. 60681J0103R	RES CHIP(贴片电阻)	680 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	1	R67
31	1. 01. 60682J0103R	RES CHIP(贴片电阻)	6. 8K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	4	R136, R279, R292, R66
32	1. 01. 60750J0103R	RES CHIP(贴片电阻)	75 Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	24	R36, R37, R39, R45, R47, R62, R63, R64, R94, R82, R98, R100, R104, R106, R108, R120, R124, R125, R126, R131, R153, R156, R161, R165
33	1. 01. 60822J0103R	RES CHIP(贴片电阻)	8. 2K Ω , 1/16W, ±5%, 0402, SMT, ROHS	pcs	4	R184, R200, R310, R321
34	1. 04. 40101J0103R	CAP CHIP(贴片电容)	COG 100pF, 6. 3V±5%, 0402, SMT, ROHS	pcs	21	C9, C28, C63, C64, C88, C89, C94, C105, C106, C135, C136, C145, C146, C147, C148, C149, C185, C187, C190, C286, C287
35	1. 04. 40102K0303R	CAP CHIP(贴片电容)	X7R, 1000pF/16V, ±10%, 0402, SMT, ROHS	pcs	5	C54, C98, C112, C119, C168
36	1. 04. 40103Z0601R	CAP CHIP(贴片电容)	0. 01uF, 50V, -20/+80%, 0402, SMT, ROHS	pcs	9	C62, C68, C160, C36, C275, C56, C57, C58, C167
37	1. 04. 40104Z0303R	CAP CHIP(贴片电容)	Y5V, 0. 1uF, 16V, -20/+80%, 0402, SMT, ROHS	pcs	55	C1, C3, C4, C5, C8, C11, C13, C15, C16, C17, C18, C19, C20, C21, C22, C23, C25, C26, C27, C29, C30, C32, C33, C34, C37, C38, C39, C55, C59 , C65, C66, C80, C90, C95, C102, C116, C117, C121, C122, C123, C124 , C126, C127, C128, C132, C134, C139, C141, C142, C143, C153, C169 , C176, C249, C279
38	1. 04. 40183Z0303R	CAP CHIP(贴片电容)	Y5V, 0. 018uF, 16V, +80/-20%, 0402, SMT, ROHS	pcs	4	C236, C237, C259, C260
39	1. 04. 40224Z0300R	CAP CHIP(贴片电容)	Y5V 0. 22uF, 16V, -20/+80%, 0603, SMT, ROHS	pcs	7	C71, C74, C157, C158, C232, C243, C130
40	1. 04. 40270J0103R	CAP CHIP(贴片电容)	NPO/27pF, 6. 3V, ±5%, 0402, SMT, OHS	pcs	5	C101, C109, C110, C120, C161
41	1. 04. 40331Z0103R	CAP CHIP(贴片电容)	330pF, 6. 3V, -20%+80%, 0402, SMT, ROHS	pcs	1	C99
42	1. 04. 40473Z0103R	CAP CHIP(贴片电容)	Y5V, 0. 047uF, 6. 3V, -20+80%, 0402, SMT, ROHS	pcs	13	C51, C52, C53, C70, C77, C78, C81, C113, C114, C115, C180, C181, C182
43	1. 04. 40561Z0103R	CAP CHIP(贴片电容)	X5R/560pF, 6. 3V, -20%+80%, 0402, SMT, ROHS	pcs	12	C46, C49, C72, C73, C75, C76, C83, C87, C154, C155, C156, C159
44	1. 04. 42105Z0600R	CAP CHIP(贴片电容)	Y5V 1uF, 16V, -20/+80%, 0603, SMT, ROHS	pcs	2	C35, C100
45	1. 04. 42225Z0100R	CAP CHIP(贴片电容)	Y5V, 2. 2uF, 6. 3V, -20/+80%, 0603, SMT, ROHS	pcs	19	C14, C24, C31, C45, C48, C82, C85, C96, C103, C104, C137, C138, C144, C165, C166, C177, C178, C233, C234
46	1. 04. 42475M0600R	CAP CHIP(贴片电容)	6. 3V 4. 7uF, 50V, ±20%, 0603, SMT, ROHS	pcs	24	C79, C108, C111, C125, C133, C150, C151, C152, C162, C163, C164, C183, C184, C186, C188, C189, C191, C192, C193, C220, C238, C240, C251, C267
47	1. 05. 3R82K0001R	COIL-CHIP (贴片电感)	0. 82uH, ±10%, 1210, 绕线电感, SMT, ROHS	pcs	1	L8
48	1. 06. 200603120R	BEAD-CHIP (贴片磁珠)	BEAD, 铁氧体磁珠/0603, 120 Ω /100MHz, SMT, ROHS	pcs	5	L2, L4, L5, L12, L18
49	1. 09. 100BA2771R	DIODE CHIP (贴片二极管)	BA277, 片状二极管, 0603, SMT, ROHS	pcs	1	D81

50	1. 09. 100BAV991R	DIODE CHIP (贴片二极管)	BAV99LT, 二極管, SOT-23, SMT, ROHS	pcs	1	D43
51	1. 09. 101N41481R	DIODE CHIP (贴片二极管)	1N4148, (SMD-DIODE-4220), 1206, SMT, ROHS	pcs	2	D30, D48
52	1. 09. 1B340A000R	DIODE CHIP (贴片二极管)	B340A, SMA, SMT, ROHS	pcs	1	D102
53	1. 09. 1BAT54C00R	DIODE CHIP (贴片二极管)	BAT54C, SOT23, SMT, ROHS	pcs	2	D2, D29
54	1. 13. 102N39041R	TR CHIP (贴片三极管)	2N3904, NPN, VCE0=40V/IC=200mA, SOT-23, SMT, ROHS	pcs	17	Q3, Q4, Q9, Q10, Q13, Q14, Q16, Q17, Q18, Q19, Q20, Q21, Q24, Q26, Q27, Q28, Q29
55	1. 13. 102N39061R	TR CHIP (贴片三极管)	2N3906, PNP, VCE0=40V/IC=200mA, SOT-23, SMT, ROHS	pcs	4	Q8, Q15, Q22, Q46
56	1. 13. 134010000R	TR CHIP (贴片三极管)	A03401, 片状MOS管, SOT23, SMT, ROHS	pcs	3	U17, Q206, Q207
57	1. 17. 210840003R	IC SMT (贴片集成电路)	LSP1084/TO-263, ADJ, SMT, ROHS	pcs	1	U19
58	1. 17. 211170006R	IC SMT (贴片集成电路)	LSP1117-33/SOT-223, SMT, ROHS	pcs	1	U11
59	1. 17. 236KE0000R	IC SMT (贴片集成电路)	TSUMV36KE, SMT, ROHS	pcs	1	U13
60	1. 17. 245580000R	IC SMT (贴片集成电路)	MC4558CDT, SO8, 8PIN, SMT, ROHS	pcs	1	U32
61	1. 17. 261800001R	IC SMT (贴片集成电路)	FP6180, SOP-8, SMT, ROHS	pcs	1	U16
62	1. 17. 274HC4052R	IC SMT (贴片集成电路)	PHILIPS, 74HC4052D, AUDIO SWITCH, SOP16, 16PIN, SMT, ROHS	pcs	1	U22
63	1. 17. 278050000R	IC SMT (贴片集成电路)	78M05-SOT252, 500MA, SMT, ROHS	pcs	1	U27
64	1. 17. 2AP1084K0R	IC	AP1084K-33LA, 集成电路3.3V/5A TO-263, Anachip /Gamma /ADD (ROHS)	pcs	1	U5
65	1. 17. 2CT3257A0R	IC SMT (贴片集成电路)	CT3257A (CBT3257ADS), SSOP-16, 16PIN, SMT, ROHS	pcs	2	U20, U21
66	1. 17. 2EN25F400R	IC Flash	EN25F40, Flash (预烧录) (丝印: F40-100GCP) (ROHS)	pcs	1	U15
67	1. 17. 2FT24C320R	IC SMT (贴片集成电路)	FT24C32A, 半导体存储器 (32K ROM), SOP8, 8PIN, SMT, ROHS	pcs	1	U14
68	1. 21. 2000HDMI2R	HDMI JACK (HDMI插座)	HDMI_J, AD3PBP19*0-*, 不带螺丝孔, 10*12个, 托盘, SMT, ROHS	pcs	1	CN13
69	1. 28. 121900811R	PCB (板材) 双面板	1.6MM, 215MM*81MM, TS26KU-20100127, (ROHS)	块	1	

广州市佳熙电子有限公司BOM单

BOM编号：7. 03. 3600E0004

产品名称:主板

规格型号：TS36, MI, ROHS

物料代码：7. 03. 3600E0004

备注：

序号	物料代码	物料名称	规格型号	单位	数量	工位
1	1. 01. 105R6J0800R	金属膜电阻	5. 6 Ω , 2W, ROHS	pcs	1	R114
2	1. 04. 10475M0300R	CAP EC (电解电容)	4. 7uF ±20%/50V/4X7 (DIP) (ROHS)	pcs	1	CA20
3	1. 04. 10477M0303R	CAP EC (电解电容)	470uF, 16V, ±20%, 8*12mm, 5. 0mm, DIP, ROHS	pcs	4	CA15, CA47, C203, C204
4	1. 04. 11106M0302R	CAP EC (电解电容)	10uF, 16V, ±20%, 5X11, 2. 5mm, DIP, 自动排插, ROHS	pcs	6	CA10, CA11, CA14, CA18, CA21, CA22
5	1. 04. 11107M0304R	CAP EC (电解电容)	100uF, 16V, ±20%, 5X11mm, 5. 0mm, DIP, 自动排插, ROHS	pcs	10	CA5, CA12, CA13, CA16, CA23, CA24, CA25, C175, C239 , C337
6	1. 04. 11108M0200R	CAP DIP (直插电容)	1000uF, 10V, ±20%, 电解电容, 8X12mm, 5. 0mm, DIP, 自动排插, ROHS	pcs	5	CA4, CA7, CA8, CA19, CA26
7	1. 04. 11227M0303R	CAP EC (电解电容)	220uF, 16V, ±20%, 6. 3X11mm, 5. 0mm, DIP, 自动排插, ROHS	pcs	1	C179
8	1. 04. 11476M0303R	CAP EC (电解电容)	47uF, 16V, ±20%, 5X11mm, 5. 0mm, DIP, 自动排插, ROHS	pcs	2	CA17, C245
9	1. 05. 6180M4000R	INDUCTOR DIP (直插电感)	18uH, ±20%, 4A, 无套管, Φ15*7, 线径0. 8mm, DIP, ROHS	pcs	1	L33
10	1. 10. 1A3891141R	SAW FILTER VIDBO (声表滤波器)	A3891141, DIP, ROHS	pcs	1	U9
11	1. 10. 1N3891110R	SAW FILTER VIDEO (声表滤波器)	N389111, DIP, ROHS	pcs	1	U10
12	1. 09. 1IN400100R	DIODE DIP (插件二极管)	IN4001, DIP, ROHS	pcs	2	D76, D77
13	1. 13. 12SC22160R	TRANSISTOR DIODE (插装三极管)	2SC2216, T0-92, DIP, ROHS	pcs	1	Q5
14	1. 16. MHZ00143R	晶振	14. 31818MHz (49SA/Lp=20pF) crystal, 引脚长4. 0±0. 5MM (ROHS)	pcs	1	X1
15	1. 17. 215170000R	IC DIP (插件集成电路)	TDA1517P, AMP2X6W, DIP18, DIP, ROHS	pcs	1	U23
16	1. 20. 330P020R	LVDS SOCKET (LVDS 插座)	LVDS SOCKET, 15X2PIN, 2. 0mm, DIP, ROHS	pcs	1	CN25
17	1. 20. 604P020R	CONN (直插插座)	2. 0mm, 4pin, 180度, DIP, ROHS	pcs	1	CN21
18	1. 20. 604P250R	CONN (直插插座)	2. 54mm, 4pin, 180度, DIP, ROHS	pcs	2	CN1, CN24
19	1. 20. 605P020R	CONN (直插插座)	2. 0mm, 5pin, 180度, DIP, ROHS	pcs	1	CN19
20	1. 20. 606P020R	CONN (直插插座)	2. 0mm, 6pin, 180度, DIP, ROHS	pcs	1	CN12
21	1. 20. 609P020R	CONN (直插插座)	2. 0mm, 9pin, 180度, DIP, ROHS	pcs	2	CN18, CN26
22	1. 21. 100000004R	VGA JACK (VGA插座)	HDR52-15F, 15P-Dsub窄型, 3. 08mm, 卧式, 带六角螺丝, DIP, ROHS	pcs	1	CN14
23	1. 21. 340100001R	SVIDEO JACK (S端子)	上面:phone-黑色, 下面:S-VIDEO, DIN-3. 5-401/E, DIP, ROHS	pcs	1	CN17
24	1. 21. 400000004R	SCART (SCART插座)	SC115, 黑色, DIP, ROHS	pcs	1	CN16
25	1. 21. 500000007R	AV JACK (AV插座)	AV6-8. 4-13D, 6孔AV端子 (下:黄-白-红;上:绿-蓝-红), 铁皮屏蔽, DIP, ROHS	pcs	1	CN15
26	1. 21. 600000001R	PHONE JACK (耳机插座)	Phone jack/PJ325C/黑色, 5PIN, DIP, ROHS	pcs	1	CN23
27	1. 21. 900000016R	Tuner (高频头)	Xinfa/TDQ-3EG2/DIP, ROHS	pcs	1	T1
28	7. 03. 3600E0003_S	MAIN BOARD (主板)	TS36, 俄罗斯, SMT, 小尺寸, ROHS	块	1	

Liteon Semiconductor Corporation

LSP1117

1A Low Dropout Linear Regulator

■ FEATURES

- 1.4V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.5V, 1.8V, 2.5V, 3.3V, 5.0V

■ APPLICATIONS

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

■ GENERAL DESCRIPTION

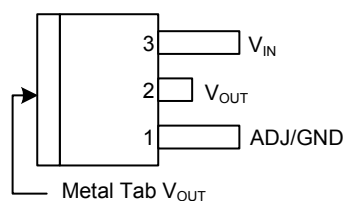
The LSP1117 is a series of low dropout three-terminal regulators with a dropout of 1.4V at 1A output current. The LSP1117 series provides current limiting and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within 2% for 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable versions. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The LSP1117 has an adjustable version that can provide the output voltage from 1.25V to 12V with only two external resistors.

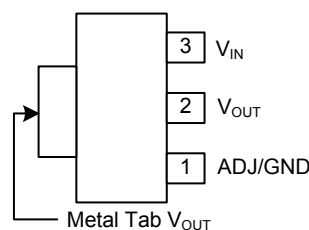
The LSP1117 series is available in the industry standard TO252-3L and SOT223 power packages.

■ PIN CONFIGURATION

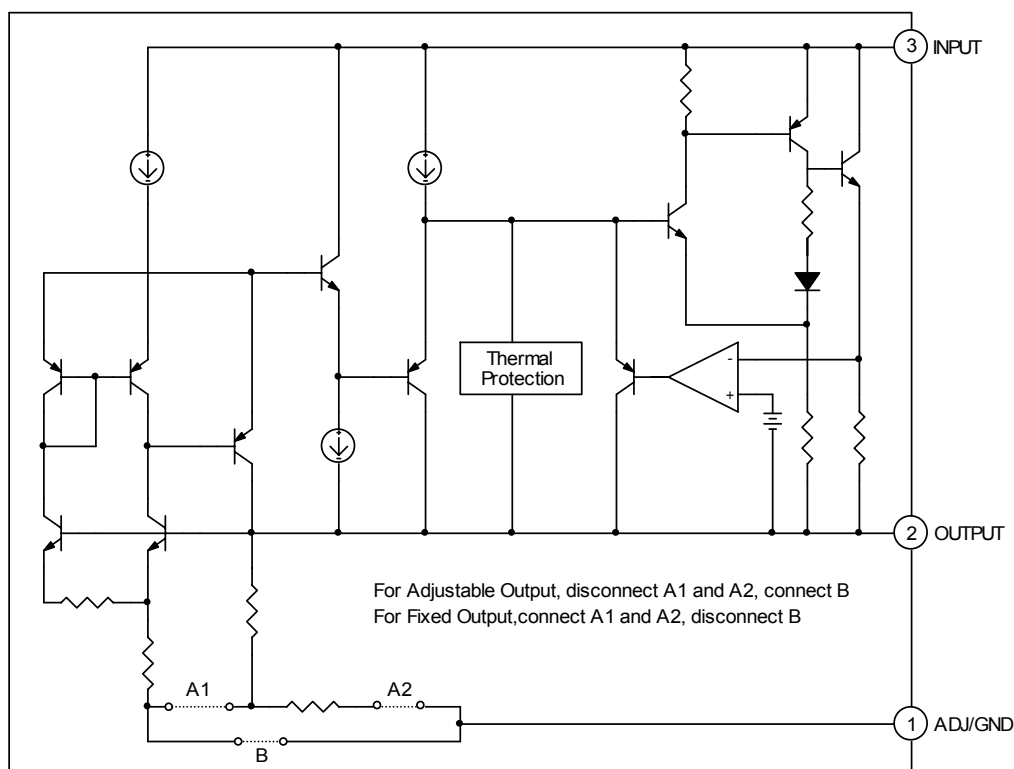
(1) TO252-3L



(2) SOT223



■ BLOCK DIAGRAM





Liteon Semiconductor Corporation

LSP1117

1A Low Dropout Linear Regulator

■ ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Maximum Junction Temperature	150	
T_S	Storage Temperature	-65~150	
T_{LEAD}	Lead Temperature (10 sec.)	300	
ESD	ESD (Machine Model)	600	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

■ RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Operating Junction Temperature Range	-40~125	

■ ELECTRICAL CHARACTERISTICS

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	LSP1117 -Adj $I_O = 10mA$, $V_{IN} - V_{OUT} = 1.5V$	1.225	1.250	1.275	V
		$I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 8V$	1.225	1.250	1.275	
Output Voltage	V_{OUT}	LSP1117 -1.5 $I_O = 10mA$, $V_{IN} = 3V$	1.485	1.5	1.515	V
		$I_O = 10mA$, $3V \leq V_{IN} \leq 10V$	1.470	1.5	1.530	
		LSP1117 -1.8 $I_O = 10mA$, $V_{IN} = 3.3V$	1.782	1.8	1.818	V
		$I_O = 10mA$, $3.3V \leq V_{IN} \leq 10V$	1.764	1.8	1.836	V
		LSP1117 -2.5 $I_O = 10mA$, $V_{IN} = 4V$	2.475	2.5	2.525	V
		$I_O = 10mA$, $4V \leq V_{IN} \leq 10V$	2.450	2.5	2.550	V
		LSP1117 -3.3 $I_O = 10mA$, $V_{IN} = 4.8V$	3.267	3.3	3.333	V
		$I_O = 10mA$, $4.8V \leq V_{IN} \leq 10V$	3.235	3.3	3.365	
		LSP1117 -5.0 $I_O = 10mA$, $V_{IN} = 6.5V$	4.950	5.0	5.050	V
		$I_O = 10mA$, $6.5V \leq V_{IN} \leq 12V$	4.900	5.0	5.100	
Line Regulation	Reg_{LINE}	LSP1117-XXX $I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 7V$		0.1	0.3	%
		$I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.1	0.5	%
Load Regulation	Reg_{Load}	LSP1117 -Adj $V_{IN} = 3V$, $10mA < I_O < 1A$		1		%
		LSP1117 -1.5 $V_{IN} = 3V$, $10mA < I_O < 1A$		12	15	mV
		LSP1117 -1.8 $V_{IN} = 3.3V$, $10mA < I_O < 1A$		15	18	mV
		LSP1117 -2.5 $V_{IN} = 4V$, $10mA < I_O < 1A$		20	25	mV
		LSP1117 -3.3 $V_{IN} = 5V$, $10mA < I_O < 1A$		26	33	mV
		LSP1117 -5.0 $V_{IN} = 6.5V$, $10mA < I_O < 1A$		40	50	mV
Dropout Voltage	$V_{IN} - V_{OUT}$	LSP1117-XXX $I_{OUT} = 1A$, $\Delta V_{OUT} = 1\% V_{OUT}$		1.3	1.4	V
Current Limit	I_{LIMIT}	LSP1117-XXX $V_{IN} - V_{OUT} = 3V$	1.1			A
Ripple Rejection		LSP1117-XXX $F = 120Hz$, $C_{OUT} = 25\mu F$ Tantalum, $V_{IN} - V_{OUT} = 3V$		60	70	dB
Temperature Stability		LSP1117-XXX $I_O = 10mA$		0.5		%



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LSP1117

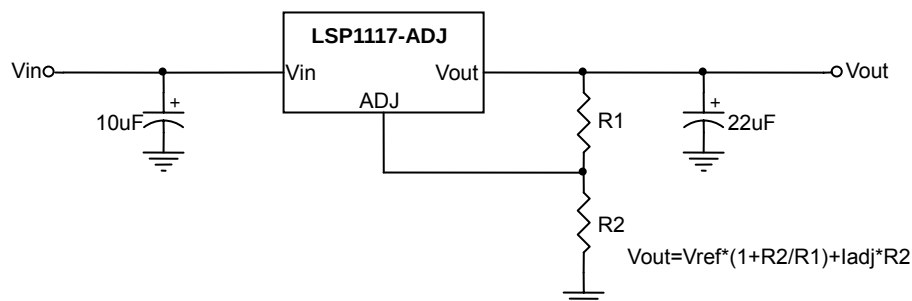
1A Low Dropout Linear Regulator

■ ELECTRICAL CHARACTERISTICS (CONTINUED)

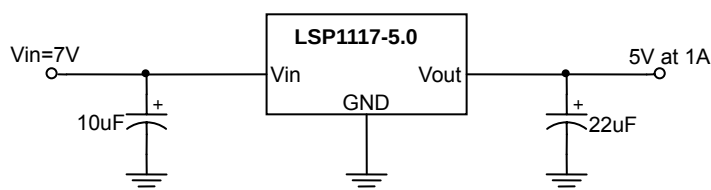
Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Adjust Pin Current		$I_O = 10mA \sim 1A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		60	120	μA
Adjust Pin Current Change		$I_O = 10mA \sim 1A$, $1.4V \leq V_{IN} - V_{OUT} \leq 10V$		0.2	5	μA
Minimum Load Current(ADJ)		LSP1117 E	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	1.7	5	mA
		LSP1117		5	10	mA
Quiescent Current	I_q	$V_{IN} = V_{OUT} + 1.25V$		5	10	mA
Long-term Stability		$T_A = 125^\circ C$, 1000hrs		0.3		%
RMS Output Noise (% of V_{OUT})		$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$		0.003		%
Power Dissipation	P_d	TO252-3L		1.2		W
		SOT223		0.625		W
Thermal Resistance, Junction to Ambient	J_A	TO252-3L		55		/ W
		SOT223		75		W
Thermal Resistance, Junction to case	J_C	TO252-3L		10		/ W
		SOT223		15		W
Thermal Shutdown		Junction Temperature		150		
Thermal Shutdown Hysteresis				25		

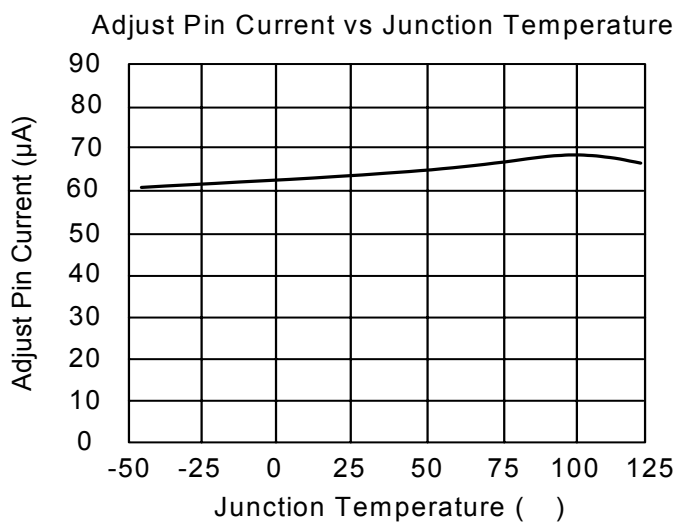
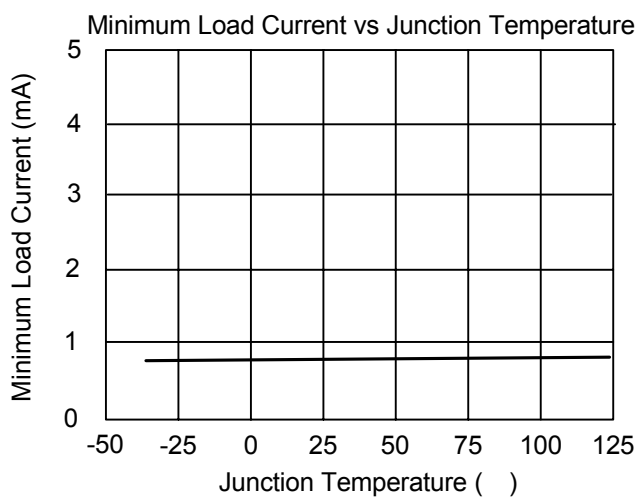
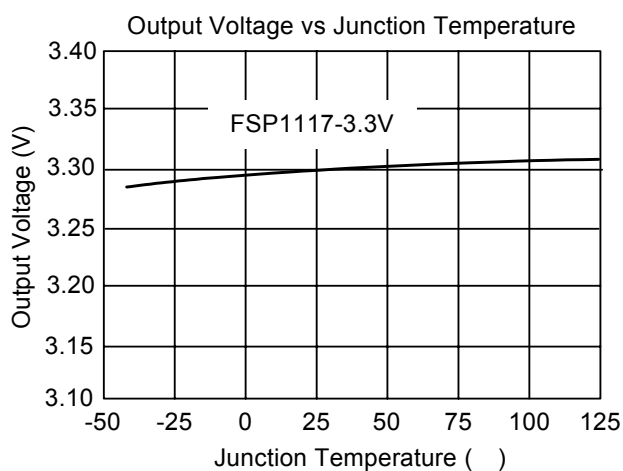
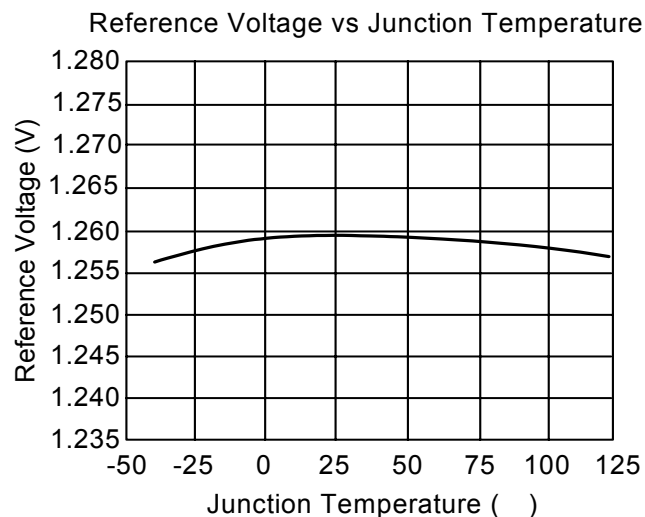
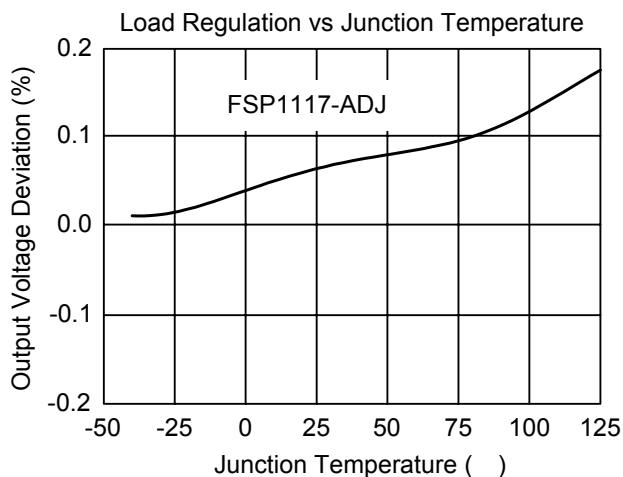
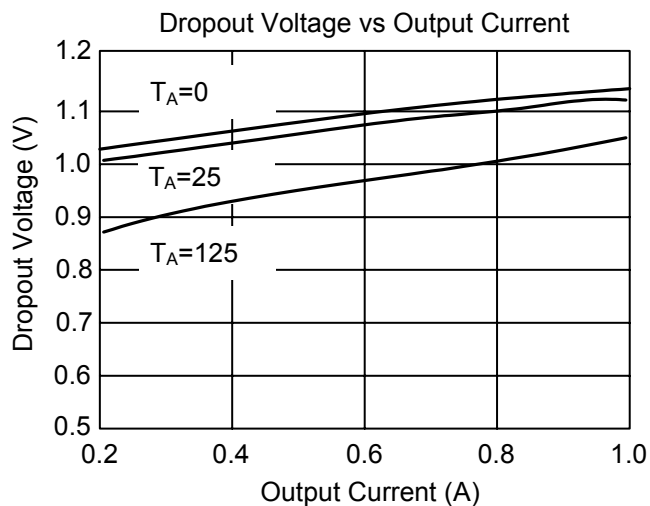
■ TYPICAL APPLICATIONS



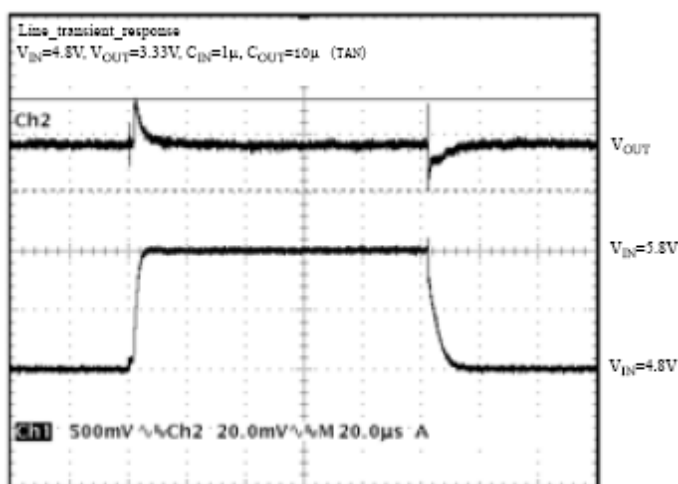
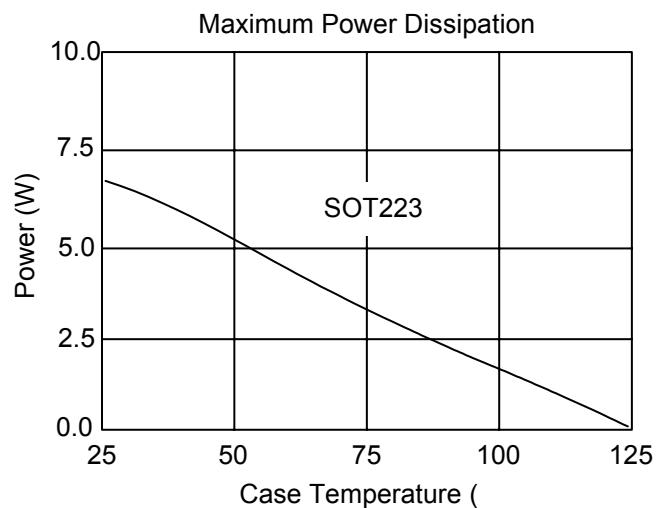
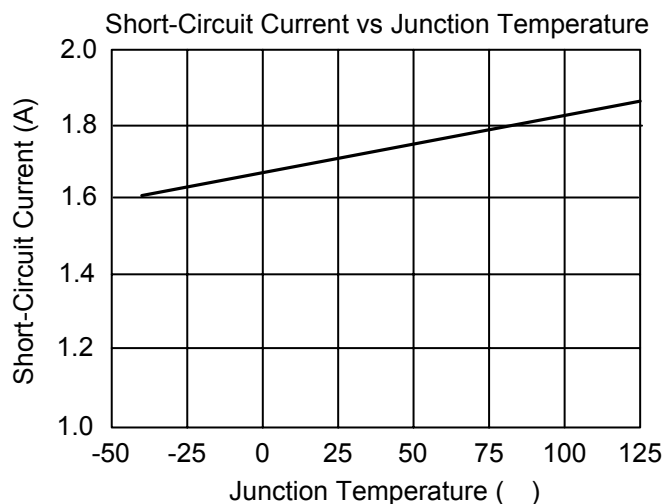
The LSP1117 keeps a constant 1.25V between the output pin and the adjust pin. By placing a resistor R1 across these two pins a constant current flows through R1, adding to the I_{adj} current and into the R2 resistor producing a voltage equal to the $(1.25/R1) * R2 + I_{adj} * R2$ which will be added to the 1.25V to set the output voltage. This is summarized in the above equation. Since the minimum load current requirement of the LSP1117 is 10mA, R1 is typically selected to be 121 Ω resistor so that it automatically satisfies the minimum current requirement. Notice that since I_{adj} is typically in the range of 50 μA it only adds a small error to the output voltage and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where R1=121 Ω and R2=200 Ω the error due to I_{adj} is only 0.3% of the nominal set point.



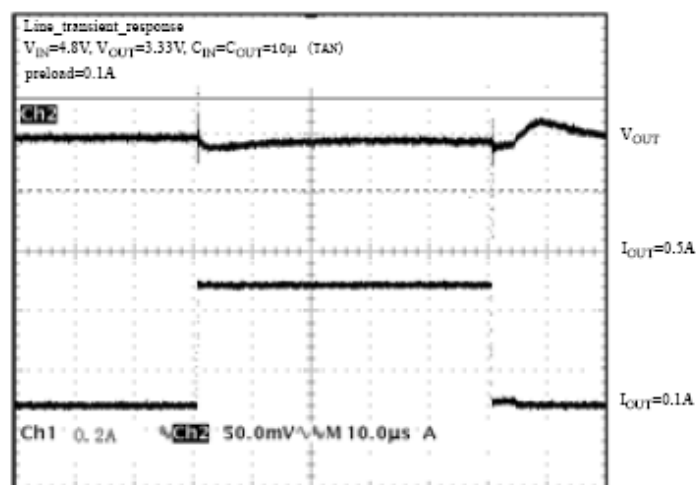
■ TYPICAL PERFORMANCE CHARACTERISTICS



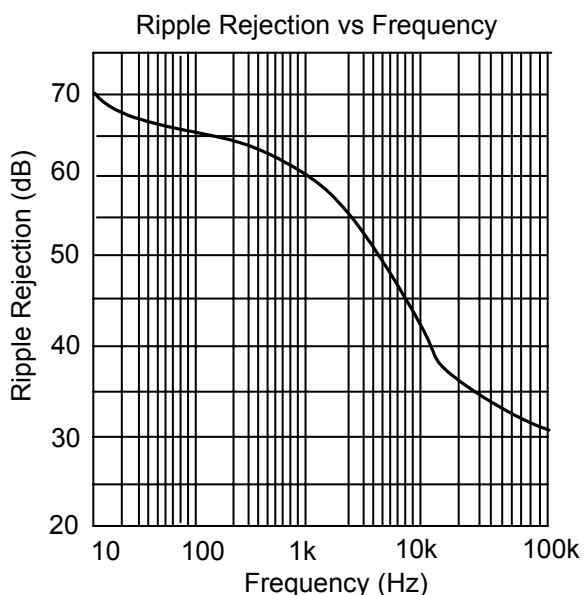
■ TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



Line Transient Response



Load Transient Response



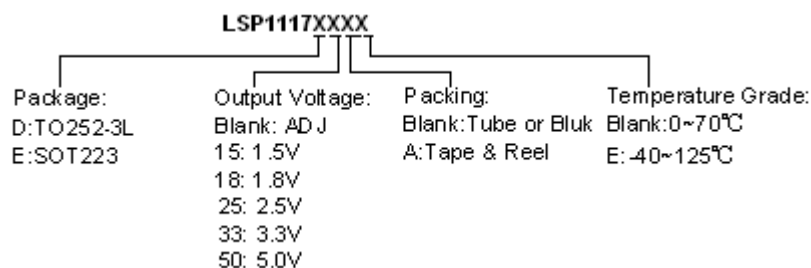


Liteon Semiconductor Corporation

LSP1117

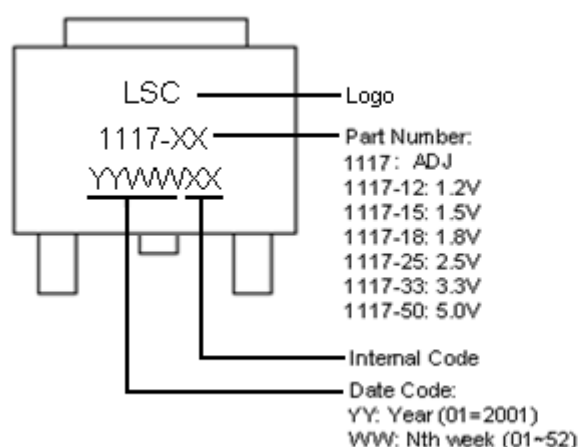
1A Low Dropout Linear Regulator

■ ORDERING INFORMATION

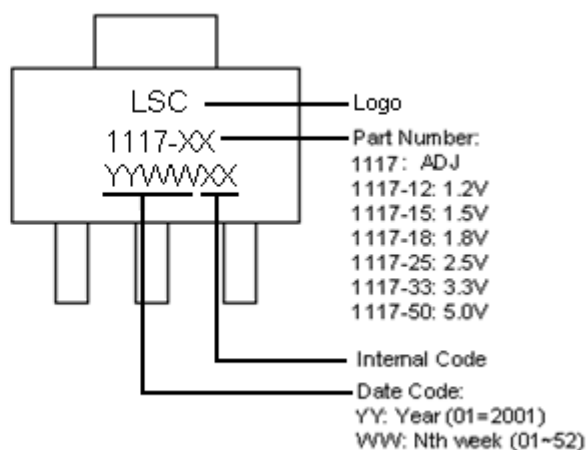


■ MARKING INFORMATION

(1) TO252-3L

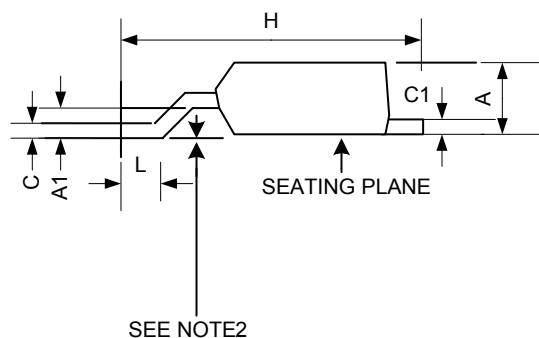
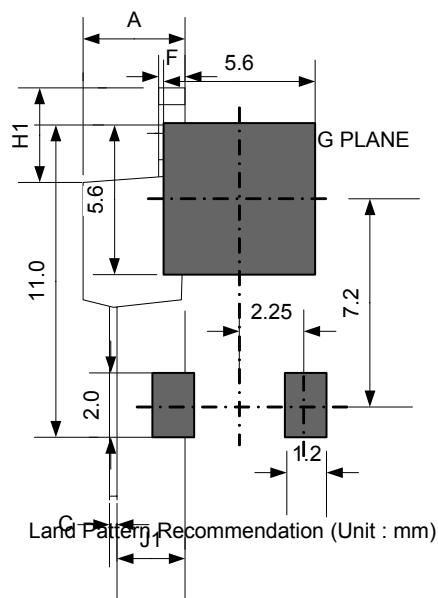
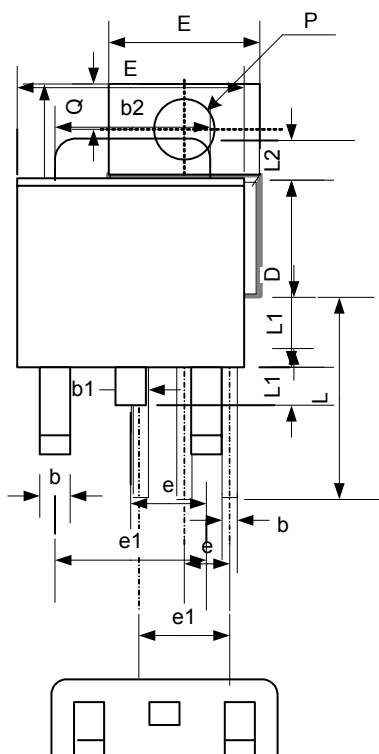


(2) SOT223



■ PACKAGE INFORMATION

(1) TO252-3L

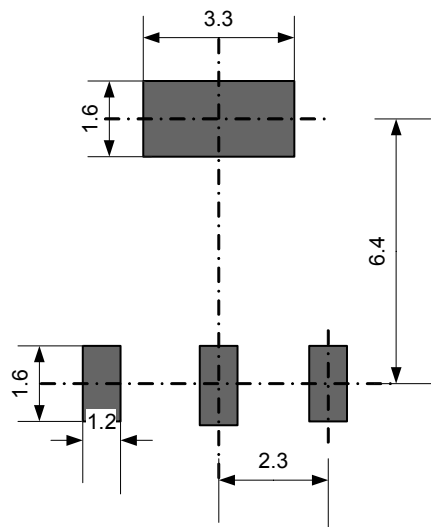
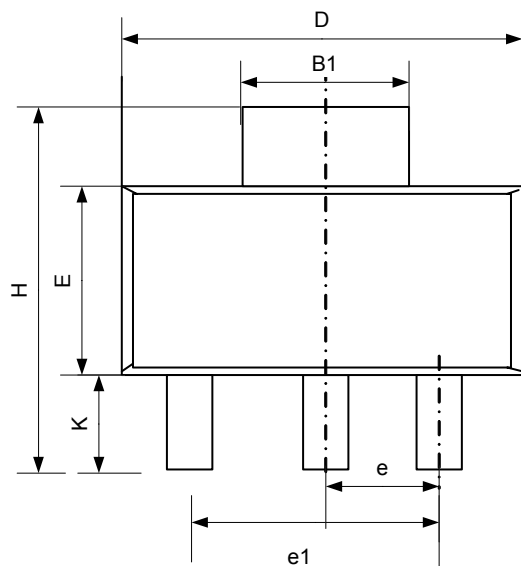


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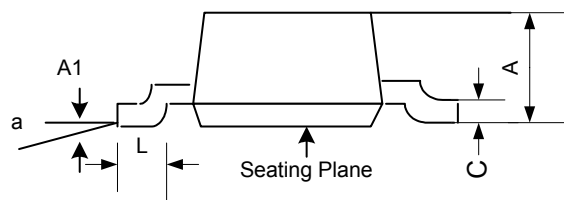
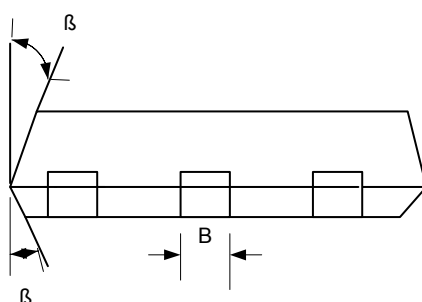
1. JEDEC Outline: TO-252 AB
2. Mils suggested for positive contact at mounting

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.39	0.086	0.090	0.094
A1	1.02	1.15	1.27	0.040	0.045	0.050
b	0.61TYP.			0.024TYP.		
b2	5.20	5.35	5.50	0.205	0.211	0.217
C	0.46	0.52	0.58	0.018	0.020	0.023
C1	0.46	0.52	0.58	0.018	0.020	0.023
D	5.33	5.57	5.80	0.210	0.219	0.228
E	6.35	6.58	6.80	0.250	0.259	0.268
e	2.25BSC.			0.089BSC.		
e1	4.50BSC.			0.177BSC.		
H	9.00	9.70	10.40	0.354	0.382	0.409
L	0.51			0.020		
L1	0.64	0.83	1.02	0.025	0.033	0.040
L2	1.52	1.78	2.03	0.060	0.070	0.080

(2) SOT223



Land Pattern Recommendation (Unit :mm)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.50	1.65	1.80	0.059	0.065	0.071
A1	0.02	0.05	0.08	0.001	0.002	0.003
B	0.60	0.70	0.80	0.024	0.028	0.031
B1	2.90		3.15(Ref.)	0.114		0.124(Ref.)
c	0.28	0.30	0.32	0.011	0.012	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
E	3.30	3.50	3.70	0.130	0.138	0.146
e	2.3Basic			0.091Basic		
e1	4.6Basic			0.181Basic		
H	6.70	7.00	7.30	0.264	0.276	0.287
L	0.91	1.00	1.10	0.036	0.039	0.043
K	1.50	1.75	2.00	0.059	0.069	0.079
α	0°	5°	10°	0°	5°	10°
β		13°			13°	

FEATURES

- 1.5V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.5V, 1.8V, 2.5V, 3.3V, 5.0V

APPLICATIONS

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

GENERAL DESCRIPTION

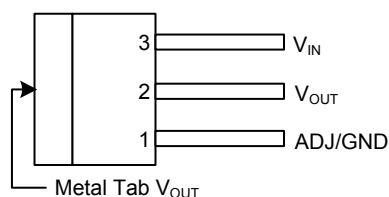
The LSP1084 is a series of low dropout three-terminal regulators with a dropout of 1.5V at 1A output current. The LSP1084 series provides current limiting and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within 2% for 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable versions. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The LSP1084 has an adjustable version that can provide the output voltage from 1.25V to 12V with only two external resistors.

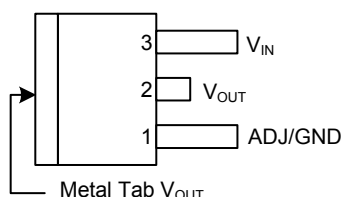
The LSP1084 series is available in the industry standard TO220-3L, TO263-3L and TO252-3L power packages.

PIN CONFIGURATION

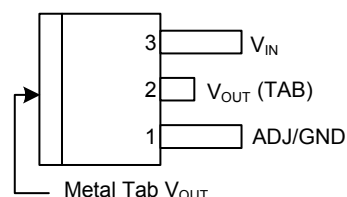
(1) TO220-3L



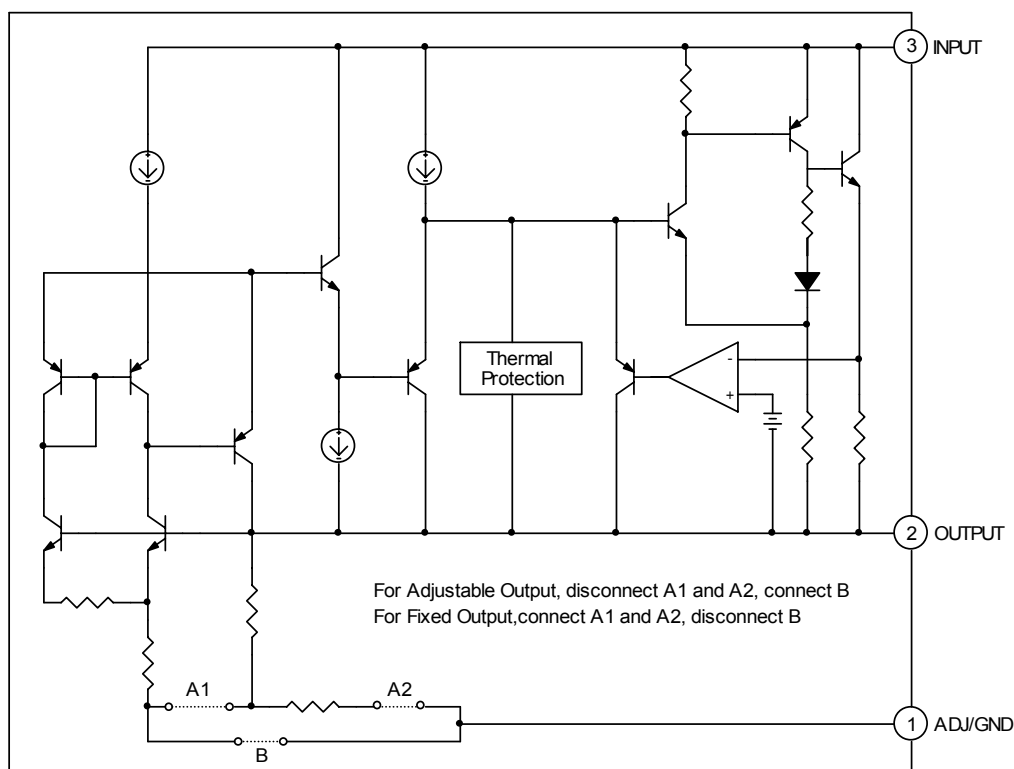
(2) TO263-3L



(3) TO252-3L



BLOCK DIAGRAM





Liteon Semiconductor Corporation

LSP1084

5A Low Dropout Linear Regulator

■ ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Maximum Junction Temperature	150	
T_S	Storage Temperature	-65~150	
T_{LEAD}	Lead Temperature (10 sec.)	300	
ESD	ESD (Machine Model)	600	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

■ RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Operating Junction Temperature Range	-20~150	

■ ELECTRICAL CHARACTERISTICS

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	LSP1084 -Adj $I_O = 10mA$, $V_{IN} - V_{OUT} = 1.5V$	1.225	1.250	1.275	V
		$I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 8V$	1.225	1.250	1.275	
Output Voltage	V_{OUT}	LSP1084 -1.5 $I_O = 10mA$, $V_{IN} = 3V$	1.485	1.5	1.515	V
		$I_O = 10mA$, $3V \leq V_{IN} \leq 10V$	1.470	1.5	1.530	
		LSP1084 -1.8 $I_O = 10mA$, $V_{IN} = 3.3V$	1.782	1.8	1.818	V
		$I_O = 10mA$, $3.3V \leq V_{IN} \leq 10V$	1.764	1.8	1.836	V
		LSP1084 -2.5 $I_O = 10mA$, $V_{IN} = 4V$	2.475	2.5	2.525	V
		$I_O = 10mA$, $4V \leq V_{IN} \leq 10V$	2.450	2.5	2.550	V
		LSP1084 -3.3 $I_O = 10mA$, $V_{IN} = 4.8V$	3.267	3.3	3.333	V
		$I_O = 10mA$, $4.8V \leq V_{IN} \leq 10V$	3.235	3.3	3.365	
		LSP1084 -5.0 $I_O = 10mA$, $V_{IN} = 6.5V$	4.950	5.0	5.050	V
		$I_O = 10mA$, $6.5V \leq V_{IN} \leq 12V$	4.900	5.0	5.100	
Line Regulation	Reg_{LINE}	LSP1084-XXX $I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 7V$		0.2	0.5	%
		$I_O = 10mA$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.2	0.5	%
Load Regulation	Reg_{Load}	LSP1084 -Adj $V_{IN} = 3V$, $10mA < I_O < 5A$		1		%
		LSP1084 -1.5 $V_{IN} = 3V$, $10mA < I_O < 5A$		12	15	mV
		LSP1084 -1.8 $V_{IN} = 3.3V$, $10mA < I_O < 5A$		15	18	mV
		LSP1084 -2.5 $V_{IN} = 4V$, $10mA < I_O < 5A$		20	25	mV
		LSP1084 -3.3 $V_{IN} = 5V$, $10mA < I_O < 5A$		26	33	mV
		LSP1084 -5.0 $V_{IN} = 6.5V$, $10mA < I_O < 5A$		40	50	mV
Dropout Voltage	$V_{IN} - V_{OUT}$	LSP1084-XXX $I_{OUT} = 5A$, $\Delta V_{OUT} = 1\% V_{OUT}$		1.3	1.5	V
Current Limit	I_{LIMIT}	LSP1084-XXX $V_{IN} - V_{OUT} = 3V$	5.1			A
Ripple Rejection		LSP1084-XXX $F = 120Hz$, $C_{OUT} = 25\mu F$ Tantalum, $V_{IN} - V_{OUT} = 3V$		60	70	dB
Temperature Stability		LSP1084-XXX $I_O = 10mA$		0.5		%



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LSP1084

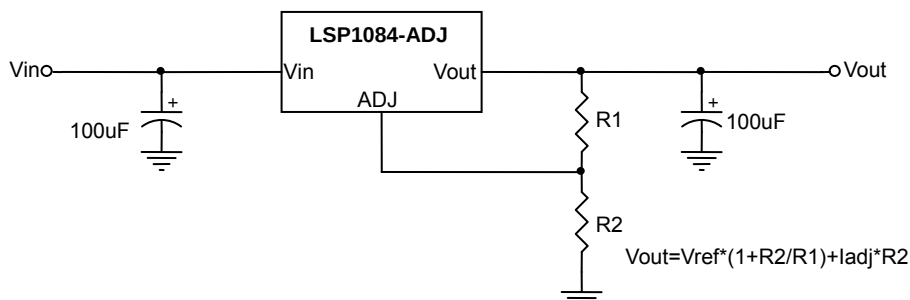
5A Low Dropout Linear Regulator

■ ELECTRICAL CHARACTERISTICS (CONTINUED)

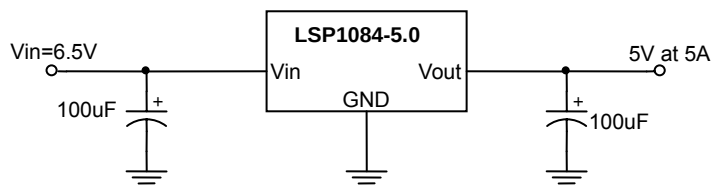
Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Adjust Pin Current		$I_O = 10mA \sim 5A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		60	120	μA
Adjust Pin Current Change		$I_O = 10mA \sim 5A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.2	5	μA
Minimum Load Current(ADJ)		LSP1084 $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		5	10	mA
Quiescent Current	I_q	$V_{IN} = V_{OUT} + 1.25V$		5	10	mA
Long-term Stability		$T_A = 125^\circ C$, 1000hrs		0.3		%
RMS Output Noise (% of V_{OUT})		$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$		0.003		%
Power Dissipation	P_d	TO220-3L		1.6		W
		TO263-3L		1.6		
		TO252-3L		1.2		
Thermal Resistance, Junction to Ambient	J_A	TO220-3L		45		/ W
		TO263-3L		45		
		TO252-3L		55		
Thermal Resistance, Junction to case	J_C	TO220-3L		2.7		/ W
		TO263-3L		2.7		
		TO252-3L		10		
Thermal Shutdown		Junction Temperature		150		
Thermal Shutdown Hysteresis				25		

■ TYPICAL APPLICATIONS



The LSP1084 keeps a constant 1.25V between the output pin and the adjust pin. By placing a resistor R1 across these two pins a constant current flows through R1, adding to the I_{adj} current and into the R2 resistor producing a voltage equal to the $(1.25/R1) * R2 + I_{adj} * R2$ which will be added to the 1.25V to set the output voltage. This is summarized in the above equation. Since the minimum load current requirement of the LSP1084 is 10mA, R1 is typically selected to be 121 Ω resistor so that it automatically satisfies the minimum current requirement. Notice that since I_{adj} is typically in the range of 50 μA it only adds a small error to the output voltage and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where $R1 = 121\Omega$ and $R2 = 200\Omega$ the error due to I_{adj} is only 0.3% of the nominal set point.





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LSP1084

5A Low Dropout Linear Regulator

■ TYPICAL APPLICATIONS (CONTINUED)

Stability

The LSP1084 requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. For most applications a minimum of 100uF aluminum electrolytic capacitor insures both stability and good transient response.

Thermal Design

The LSP1084 incorporates an internal thermal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of 150 °C, it is recommended that the selected heat sink be chosen such that during maximum continuous load operation the junction temperature is kept below the temperature.

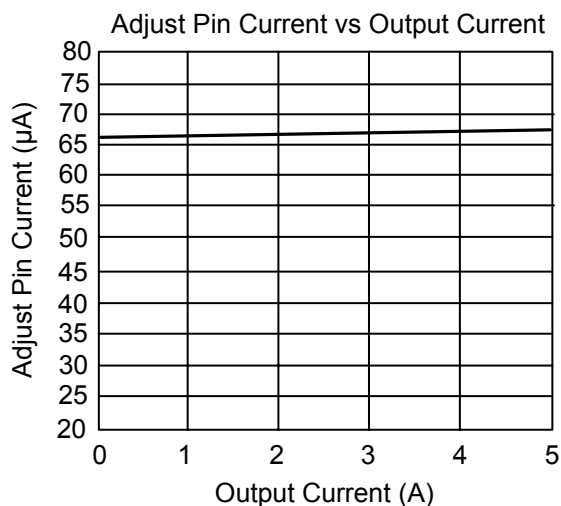
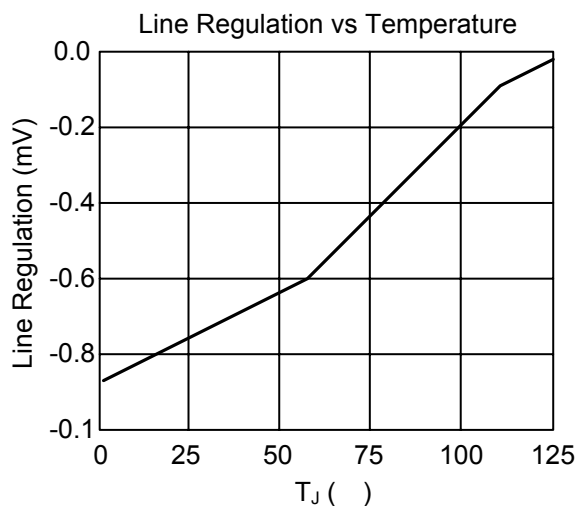
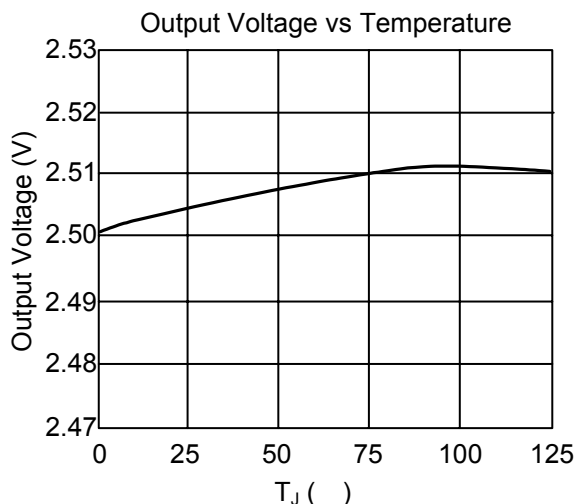
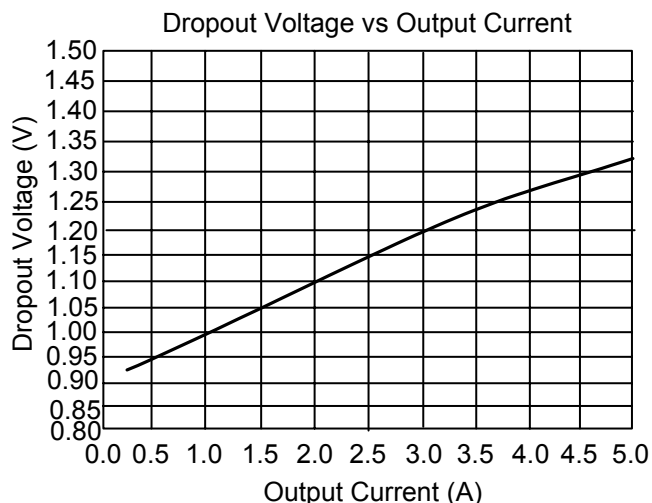
$$P_d = V_{out} \cdot I_{out}$$

$$T_j = T_A + P_d \cdot \theta_{JA} < 150$$

Layout Consideration

The output capacitors must be located as close to the Vout terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the Vout pin to the output capacitors to prevent any high frequency oscillation that may result due to excessive trace inductance.

■ TYPICAL PERFORMANCE CHARACTERISTICS



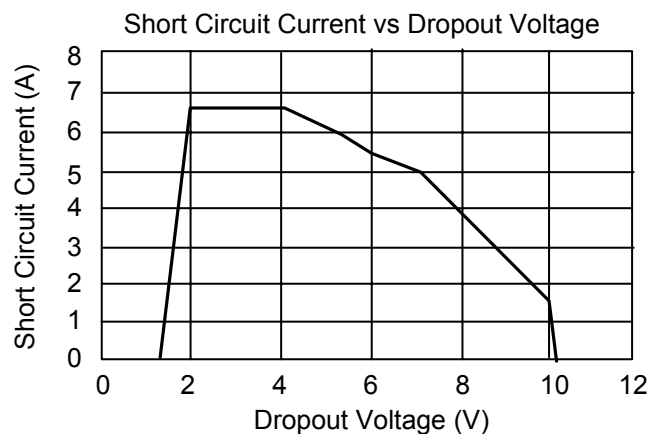
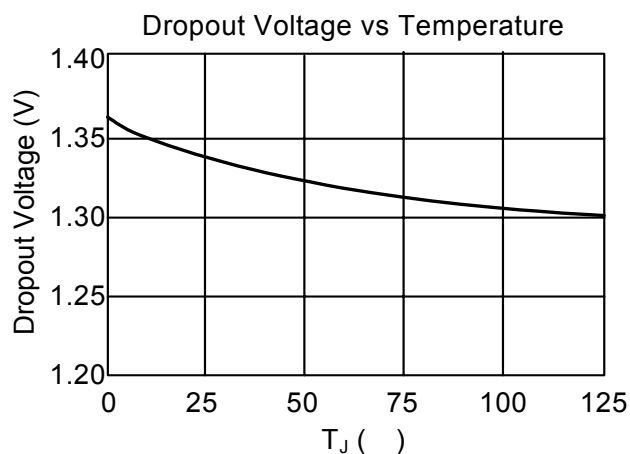


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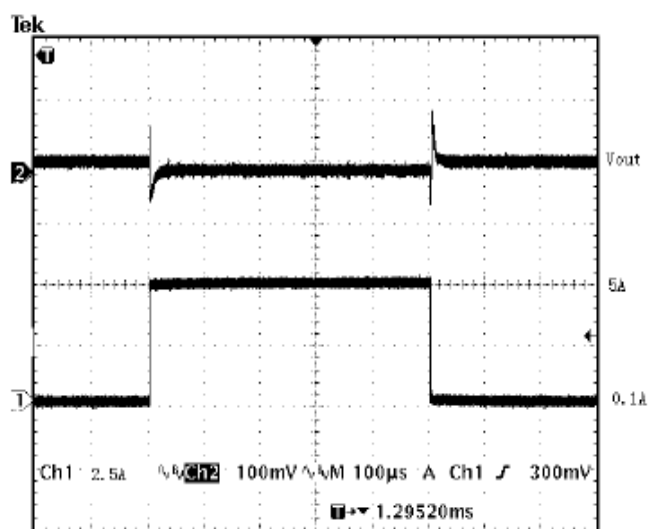
LSP1084

5A Low Dropout Linear Regulator

■ TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

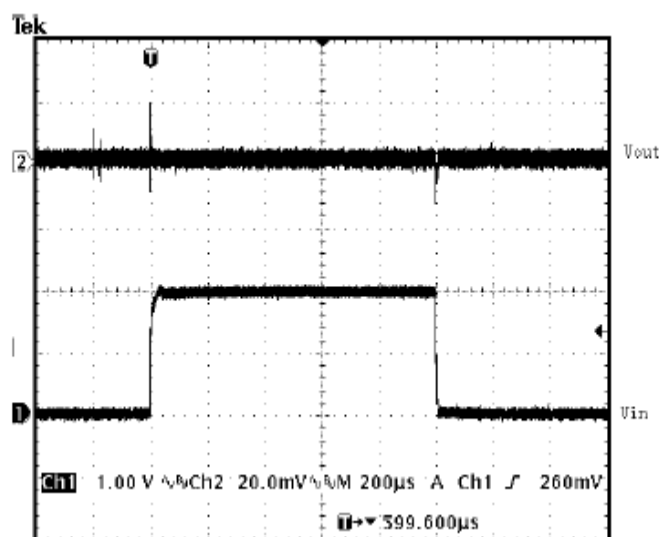


Load Transient Response



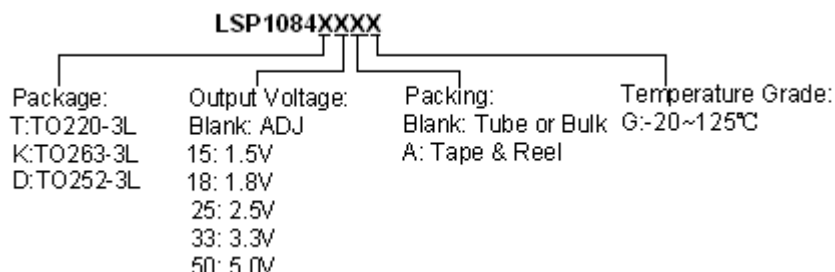
$V_{in}=5.5V$, $V_{out}=2.5V$ $I_o=100mA$ to $5A$ $C_{in}=C_{out}=100\mu F(\tan)$

Line Transient Response



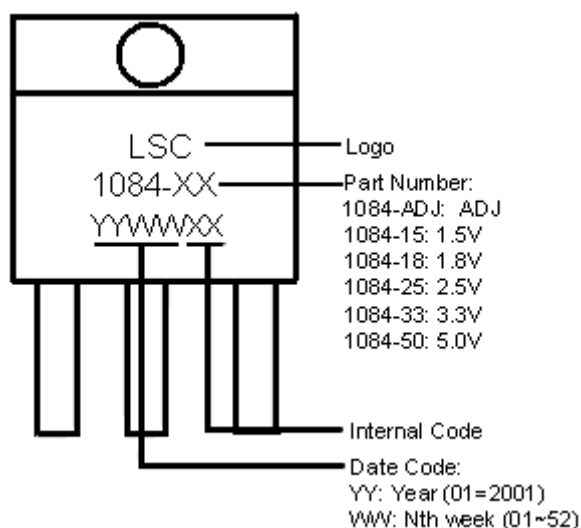
$V_{in}=4.5V$ to $6.5V$ $V_{out}=2.5V$ $I_o=200mA$ $C_{in}=C_{out}=100\mu F(\tan)$

■ ORDERING INFORMATION

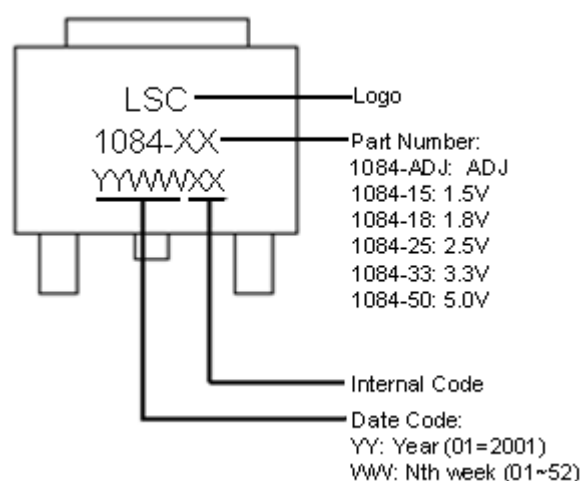


■ MARKING INFORMATION

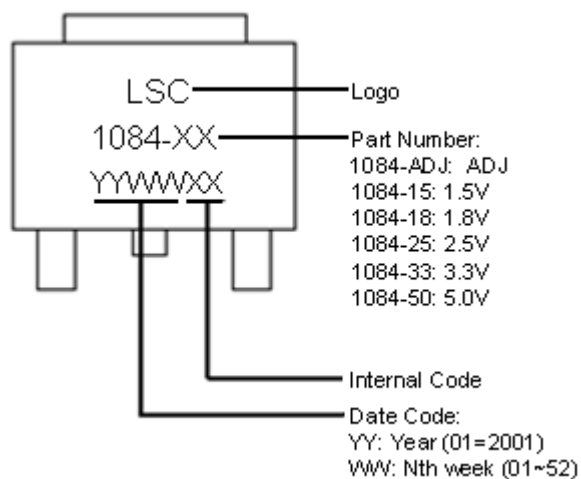
(1) TO220-3L



(2) TO263-3L



(3) TO252-3L





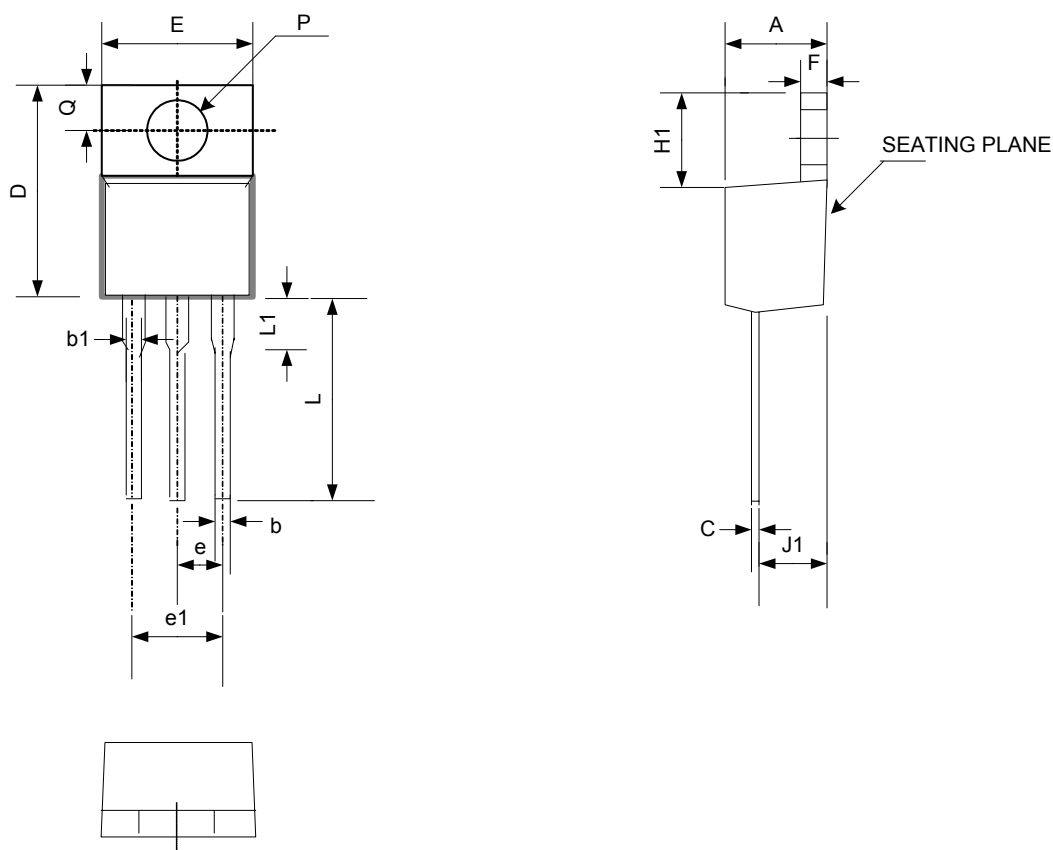
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5A Low Dropout Linear Regulator

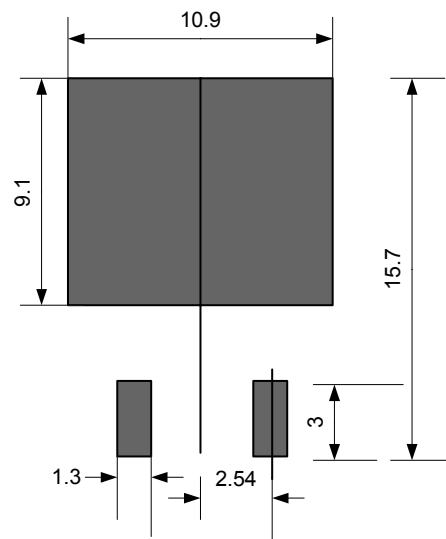
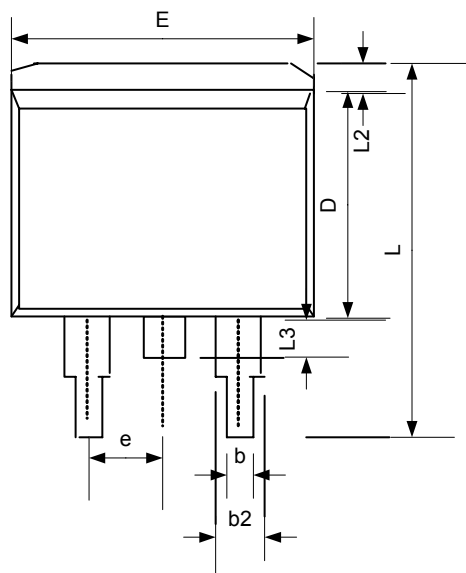
■ PACKAGE INFORMATION

(1) TO220-3L

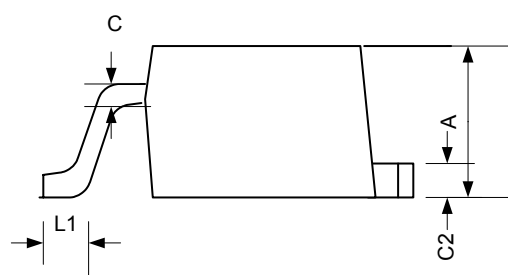
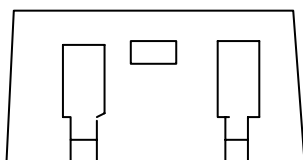


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.56	4.20	4.82	0.140	0.165	0.190
b1	1.16	1.46	1.76	0.046	0.057	0.069
b	0.51	0.813	1.14	0.020	0.032	0.045
C	0.356		0.406	0.014		0.016
D	14.20	15.35	16.50	0.559	0.604	0.650
E	9.66	10.20	10.66	0.380	0.402	0.420
e	2.29	2.54	2.79	0.090	0.100	0.110
e1	4.83	5.08	5.33	0.190	0.200	0.210
F	0.55	0.95	1.35	0.022	0.037	0.053
H1	5.84	6.35	6.86	0.230	0.250	0.270
J1	2.08	2.48	2.88	0.082	0.098	0.113
L	12.72	13.72	14.72	0.501	0.540	0.580
L1	3.66	5.00	6.35	0.144	0.197	0.250
P	3.56	3.81	4.06	0.140	0.150	0.160
Q	2.58	2.98	3.38	0.102	1.117	0.133

(2) TO263-3L

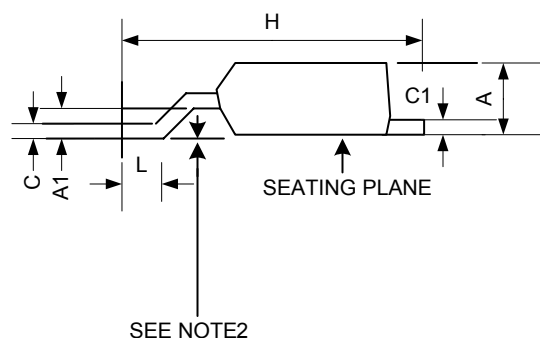
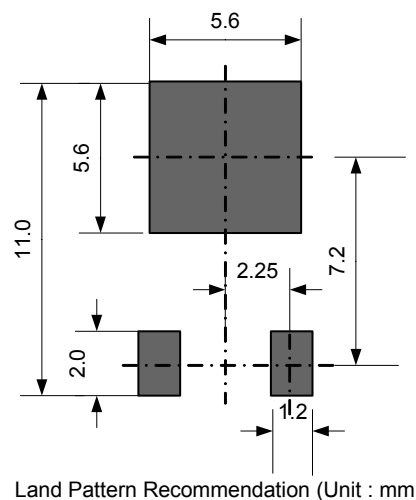
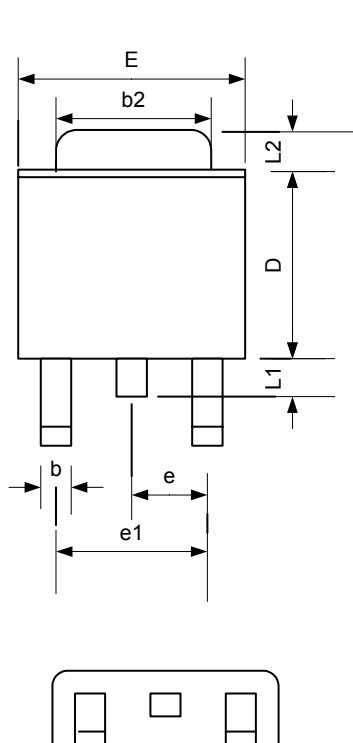


Land Pattern Recommendation (Unit : mm)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.06	4.45	4.83	0.160	0.175	0.190
b	0.51	0.75	0.99	0.020	0.030	0.039
b2	1.14	1.27	1.40	0.045	0.050	0.055
C	0.38TYP.			0.015TYP.		
C2	1.14	1.27	1.40	0.045	0.050	0.055
D	8.65	9.15	9.65	0.341	0.360	0.380
E	9.65	9.97	10.29	0.380	0.393	0.405
e	2.54BSC.			0.100BSC.		
L	14.61	15.24	15.88	0.575	0.600	0.625
L1	2.28	2.54	2.80	0.090	0.100	0.110
L2		1.30	2.92		0.051	0.115
L3	1.27	1.52	1.78	0.050	0.060	0.070

(3) TO252-3L



Notes:

1. JEDEC Outline: TO-252 AB
2. Mils suggested for positive contact at mounting

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.38	0.086	0.090	0.094
A1	1.08	1.15	1.32	0.043	0.045	0.052
b	0.64		0.78	0.025		0.031
b2	5.23	5.35	5.43	0.206	0.211	0.214
C	0.51TYP.			0.020TYP.		
C1	0.46	0.52	0.58	0.018	0.020	0.023
D	5.33	5.57	5.80	0.210	0.219	0.228
E	6.38	6.58	6.68	0.251	0.259	0.263
e	2.24		2.34	0.088		0.092
e1	4.48		4.68	0.176		0.184
H	9.00	9.70	10.40	0.354	0.382	0.409
L	0.51			0.020		
L1	0.65	0.83	0.95	0.026	0.033	0.037
L2	1.52	1.78	2.03	0.060	0.070	0.080



Liteon Semiconductor Corporation

LSP1084

5A Low Dropout Linear Regulator

■ UPDATE HISTORY

Date	Version	Descriptions
20090420	Rev1.1	Revise LSP1084's temperature grade from 0~70 to -20~125 (By Fredwu)

FEATURES

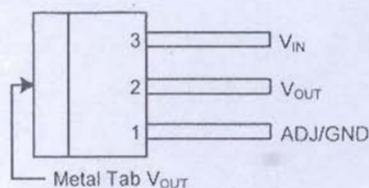
- 1.5V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.5V, 1.8V, 2.5V, 3.3V, 5.0V

APPLICATIONS

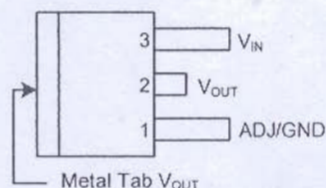
- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

PIN CONFIGURATION

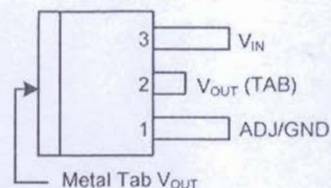
(1) TO220-3L



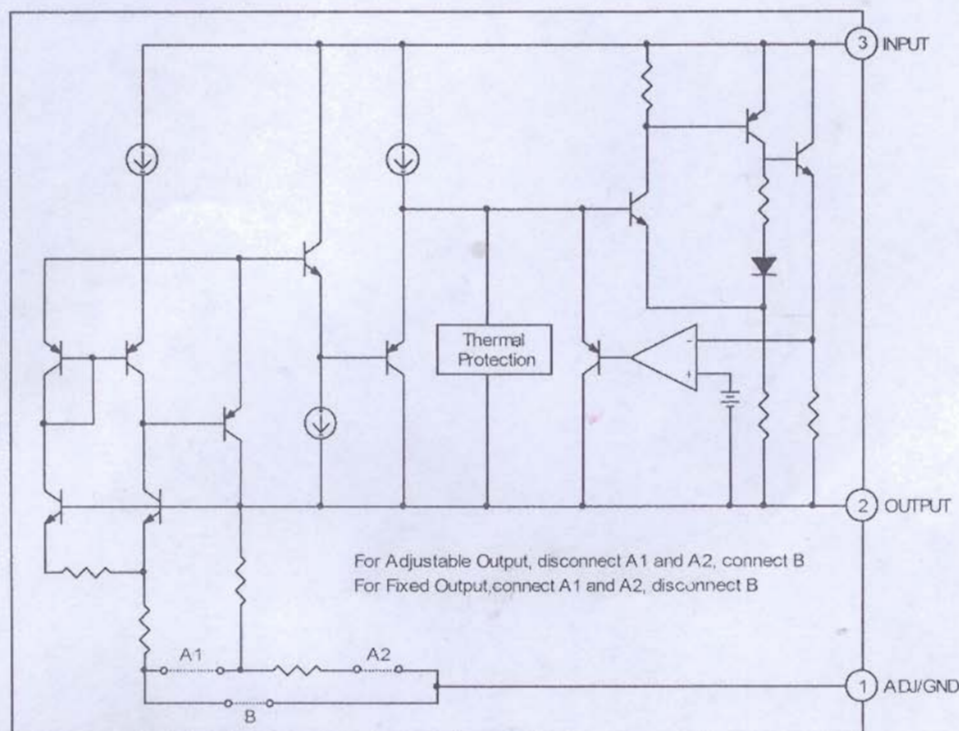
(2) TO263-3L



(3) TO252-3L



BLOCK DIAGRAM



GENERAL DESCRIPTION

The LSP1084 is a series of low dropout three-terminal regulators with a dropout of 1.5V at 1A output current. The LSP1084 series provides current limiting and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within 2% for 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable versions. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The LSP1084 has an adjustable version that can provide the output voltage from 1.25V to 12V with only two external resistors.

The LSP1084 series is available in the industry standard TO220-3L, TO263-3L and TO252-3L power packages.

■ ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Maximum Junction Temperature	150	°C
T_S	Storage Temperature	-65~150	°C
T_{LEAD}	Lead Temperature (10 sec.)	300	°C
ESD	ESD (Machine Model)	600	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

■ RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	12	V
T_J	Operating Junction Temperature Range	-20~150	°C

■ ELECTRICAL CHARACTERISTICS

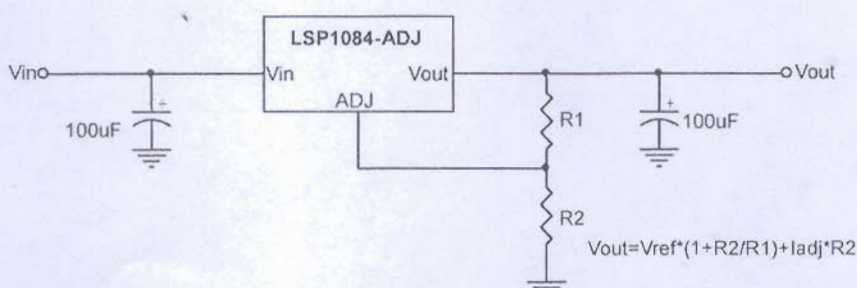
Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Reference Voltage	V _{REF}	LSP1084 -Adj	I _O =10mA, V _{IN} -V _{OUT} =1.5V	1.225	1.250	1.275	V
			I _O =10mA, 1.5V≤V _{IN} -V _{OUT} ≤8V	1.225	1.250	1.275	
Output Voltage	V _{OUT}	LSP1084 -1.5	I _O =10mA, V _{IN} =3V	1.485	1.5	1.515	V
			I _O =10mA, 3V≤V _{IN} ≤10V	1.470	1.5	1.530	
		LSP1084 -1.8	I _O =10mA, V _{IN} =3.3V	1.782	1.8	1.818	V
			I _O =10mA, 3.3V≤V _{IN} ≤10V	1.764	1.8	1.836	V
		LSP1084 -2.5	I _O =10mA, V _{IN} =4V	2.475	2.5	2.525	V
			I _O =10mA, 4V≤V _{IN} ≤10V	2.450	2.5	2.550	V
		LSP1084 -3.3	I _O =10mA, V _{IN} =4.8V	3.267	3.3	3.333	V
			I _O =10mA, 4.8V≤V _{IN} ≤10V	3.235	3.3	3.365	
		LSP1084 -5.0	I _O =10mA, V _{IN} =6.5V	4.950	5.0	5.050	V
			I _O =10mA, 6.5V≤V _{IN} ≤12V	4.900	5.0	5.100	
Line Regulation	Reg _{LINE}	LSP1084-XXX	I _O =10mA, 1.5V≤V _{IN} -V _{OUT} ≤7V		0.2	0.5	%
			I _O =10mA, 1.5V≤V _{IN} -V _{OUT} ≤10V		0.2	0.5	%
Load Regulation	Reg _{Load}	LSP1084 -Adj	V _{IN} = 3V, 10mA<I _O <5A		1		%
		LSP1084 -1.5	V _{IN} = 3V, 10mA<I _O <5A		12	15	mV
		LSP1084 -1.8	V _{IN} = 3.3V, 10mA<I _O <5A		15	18	mV
		LSP1084 -2.5	V _{IN} = 4V, 10mA<I _O <5A		20	25	mV
		LSP1084 -3.3	V _{IN} = 5V, 10mA<I _O <5A		26	33	mV
		LSP1084 -5.0	V _{IN} = 6.5V, 10mA<I _O <5A		40	50	mV
Dropout Voltage	V _{IN} -V _{OUT}	LSP1084-XXX	I _{OUT} = 5A, ΔV _{OUT} =1%V _{OUT}		1.3	1.5	V
Current Limit	I _{LIMIT}	LSP1084-XXX	V _{IN} -V _{OUT} =3V	5.1			A
Ripple Rejection		LSP1084-XXX	F=120Hz, C _{OUT} =25uF Tantalum, V _{IN} -V _{OUT} =3V		60	70	dB
Temperature Stability		LSP1084-XXX	I _O =10mA		0.5		%

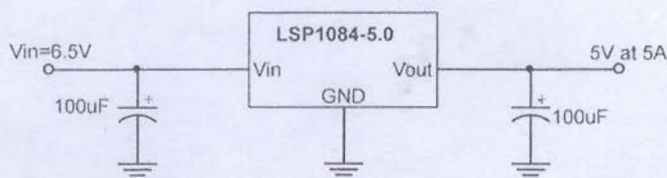
ELECTRICAL CHARACTERISTICS (CONTINUED)

 Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Adjust Pin Current		$I_O = 10mA \sim 5A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		60	120	μA
Adjust Pin Current Change		$I_O = 10mA \sim 5A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.2	5	μA
Minimum Load Current(ADJ)		LSP1084 $1.5V \leq V_{IN} - V_{OUT} \leq 10V$		5	10	mA
Quiescent Current	I_q	$V_{IN} = V_{OUT} + 1.25V$		5	10	mA
Long-term Stability		$T_A = 125^\circ C$, 1000hrs		0.3		%
RMS Output Noise (% of V_{OUT})		$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$		0.003		%
Power Dissipation	P_d	TO220-3L		1.6		W
		TO263-3L		1.6		
		TO252-3L		1.2		
Thermal Resistance, Junction to Ambient	θ_{JA}	TO220-3L		45		$^\circ C/W$
		TO263-3L		45		
		TO252-3L		55		
Thermal Resistance, Junction to case	θ_{JC}	TO220-3L		2.7		$^\circ C/W$
		TO263-3L		2.7		
		TO252-3L		10		
Thermal Shutdown		Junction Temperature		150		$^\circ C$
Thermal Shutdown Hysteresis				25		$^\circ C$

TYPICAL APPLICATIONS


The LSP1084 keeps a constant 1.25V between the output pin and the adjust pin. By placing a resistor R1 across these two pins a constant current flows through R1, adding to the I_{adj} current and into the R2 resistor producing a voltage equal to the $(1.25/R1) \cdot R2 + I_{adj} \cdot R2$ which will be added to the 1.25V to set the output voltage. This is summarized in the above equation. Since the minimum load current requirement of the LSP1084 is 10mA, R1 is typically selected to be 121 Ω resistor so that it automatically satisfies the minimum current requirement. Notice that since I_{adj} is typically in the range of 50 μA it only adds a small error to the output voltage and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where $R1 = 121\Omega$ and $R2 = 200\Omega$ the error due to I_{adj} is only 0.3% of the nominal set point.



■ TYPICAL APPLICATIONS (CONTINUED)

Stability

The LSP1084 requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. For most applications a minimum of 100uF aluminum electrolytic capacitor insures both stability and good transient response.

Thermal Design

The LSP1084 incorporates an internal thermal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of 150°C, it is recommended that the selected heat sink be chosen such that during maximum continuous load operation the junction temperature is kept below the temperature.

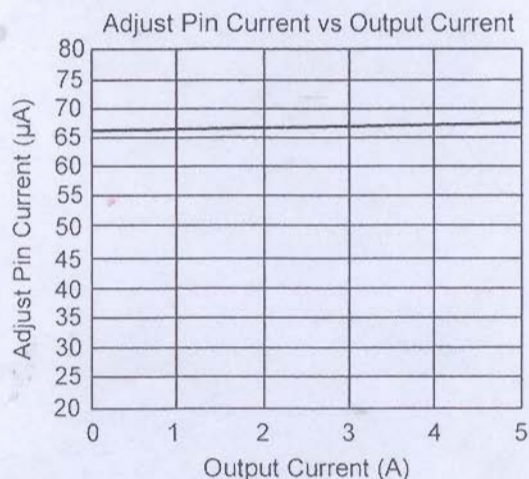
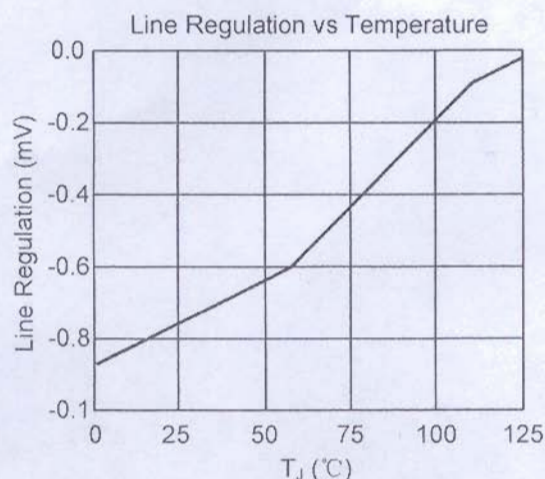
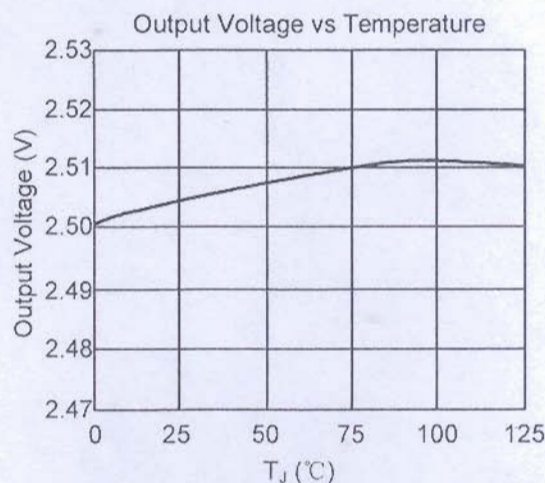
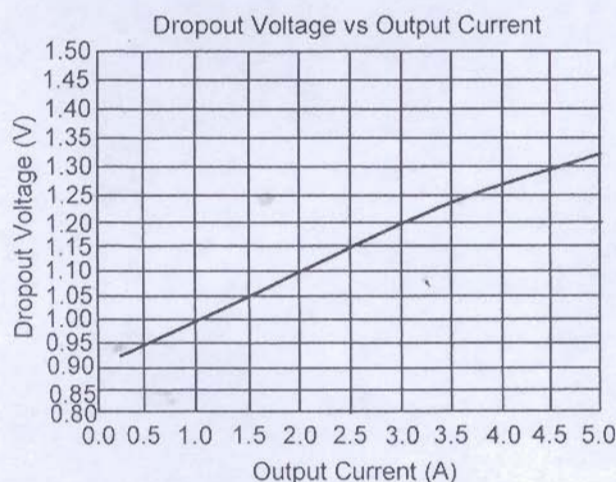
$$P_d = V_{out} \cdot I_{out}$$

$$T_j = T_A + P_d \cdot \theta_{JA} < 150^\circ\text{C}$$

Layout Consideration

The output capacitors must be located as close to the Vout terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the Vout pin to the output capacitors to prevent any high frequency oscillation that may result due to excessive trace inductance.

■ TYPICAL PERFORMANCE CHARACTERISTICS



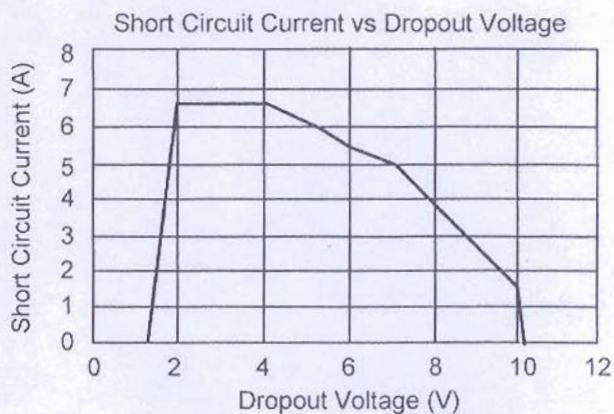
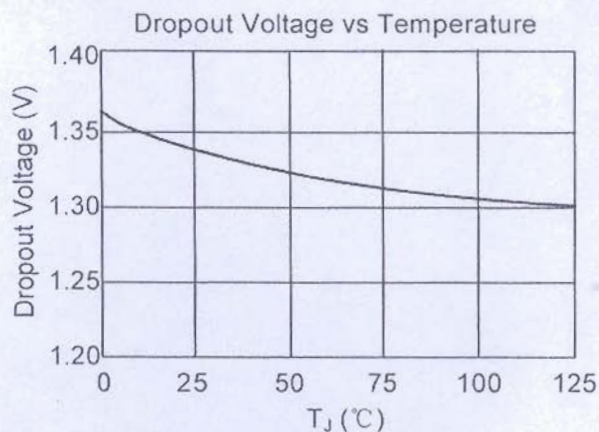


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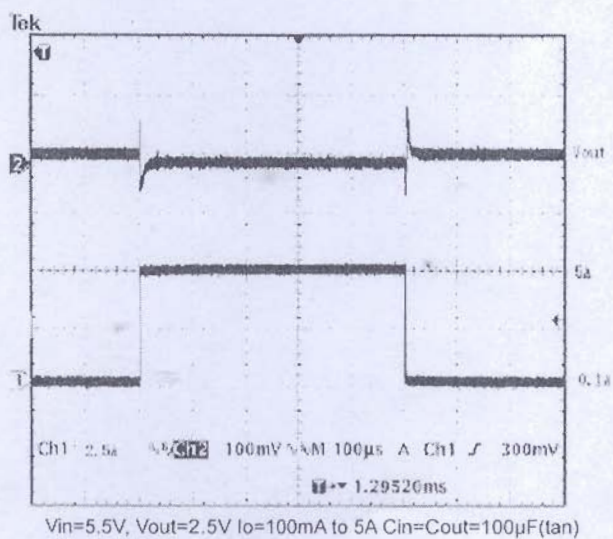
LSP1084

5A Low Dropout Linear Regulator

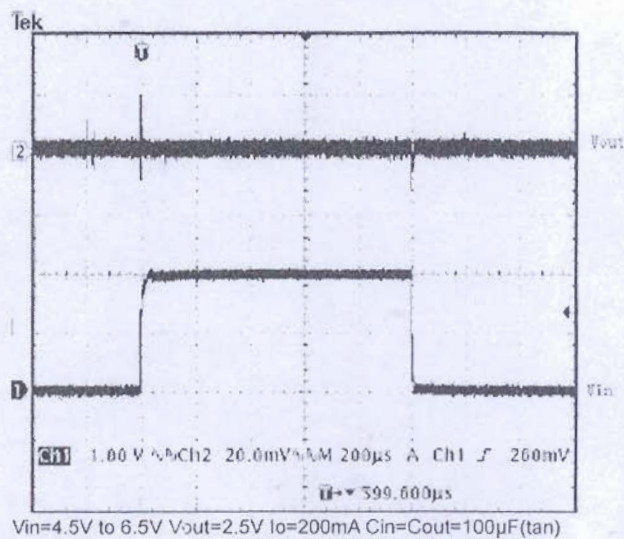
■ TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



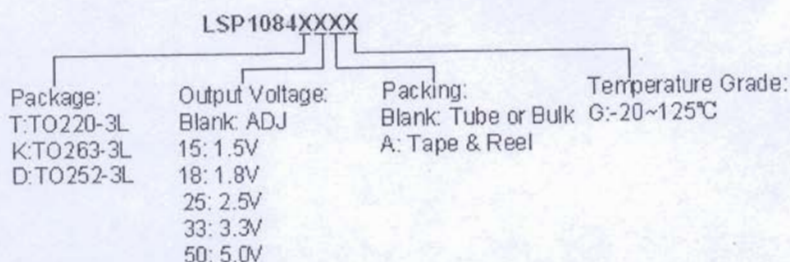
Load Transient Response



Line Transient Response

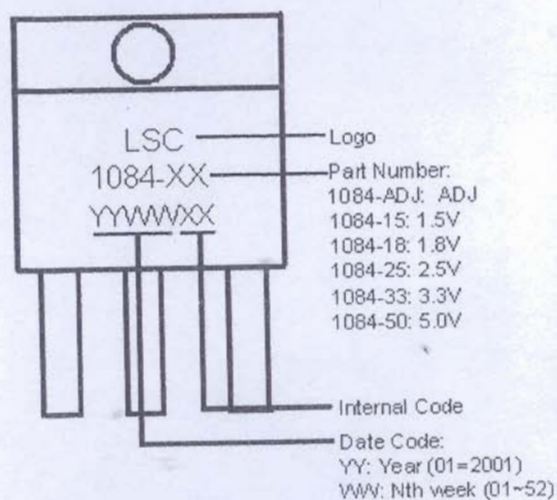


ORDERING INFORMATION

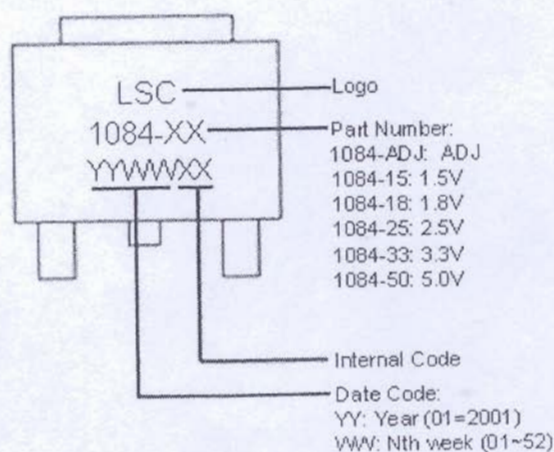


MARKING INFORMATION

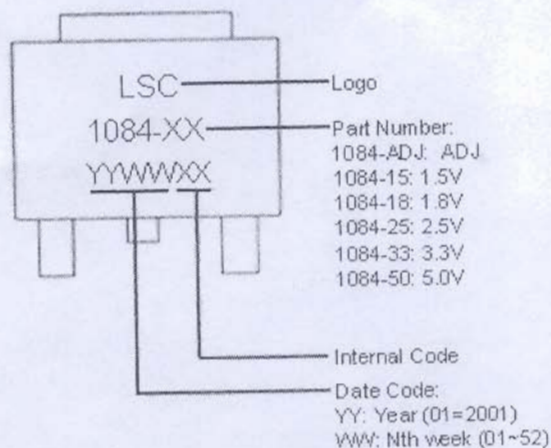
(1) TO220-3L

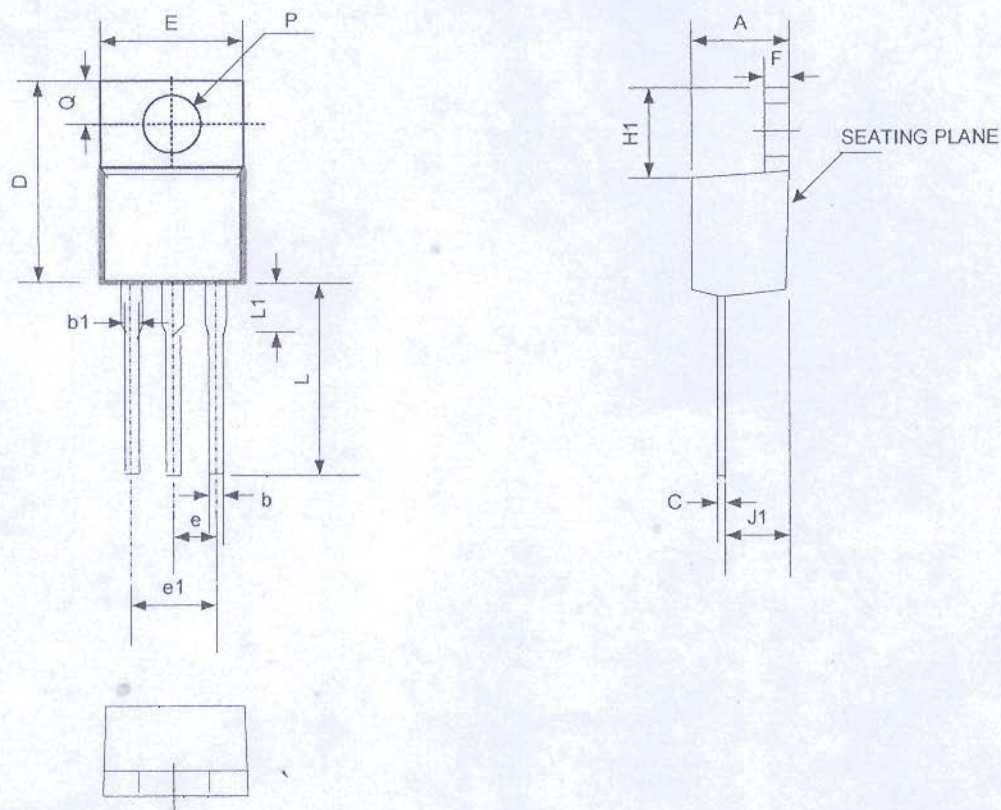


(2) TO263-3L



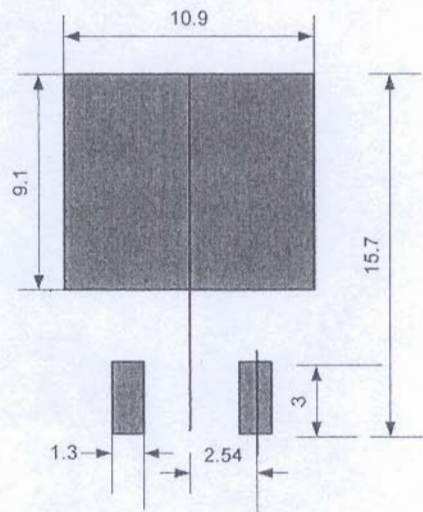
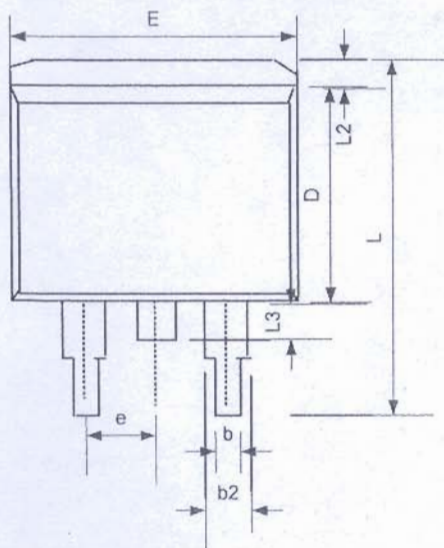
(3) TO252-3L



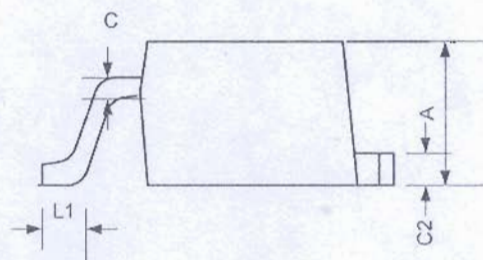
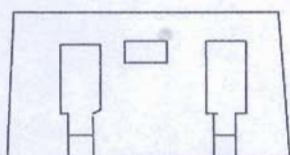
■ PACKAGE INFORMATION
(1) TO220-3L


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.56	4.20	4.82	0.140	0.165	0.190
b1	1.16	1.46	1.76	0.046	0.057	0.069
b	0.51	0.813	1.14	0.020	0.032	0.045
C	0.356		0.406	0.014		0.016
D	14.20	15.35	16.50	0.559	0.604	0.650
E	9.66	10.20	10.66	0.380	0.402	0.420
e	2.29	2.54	2.79	0.090	0.100	0.110
e1	4.83	5.08	5.33	0.190	0.200	0.210
F	0.55	0.95	1.35	0.022	0.037	0.053
H1	5.84	6.35	6.86	0.230	0.250	0.270
J1	2.08	2.48	2.88	0.082	0.098	0.113
L	12.72	13.72	14.72	0.501	0.540	0.580
L1	3.66	5.00	6.35	0.144	0.197	0.250
P	3.56	3.81	4.06	0.140	0.150	0.160
Q	2.58	2.98	3.38	0.102	1.117	0.133

(2) TO263-3L

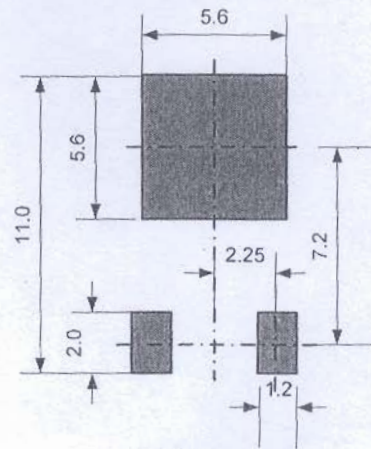
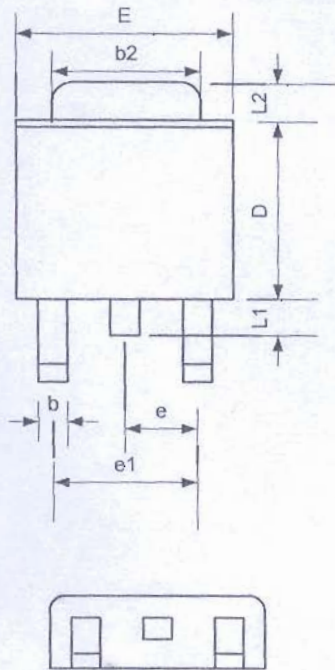


Land Pattern Recommendation (Unit : mm)

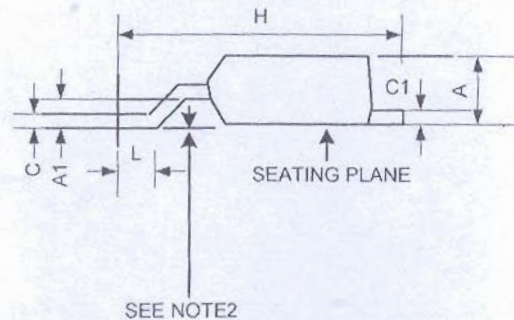


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.06	4.45	4.83	0.160	0.175	0.190
b	0.51	0.75	0.99	0.020	0.030	0.039
b2	1.14	1.27	1.40	0.045	0.050	0.055
C	0.38TYP.			0.015TYP.		
C2	1.14	1.27	1.40	0.045	0.050	0.055
D	8.65	9.15	9.65	0.341	0.360	0.380
E	9.65	9.97	10.29	0.380	0.393	0.405
e	2.54BSC.			0.100BSC.		
L	14.61	15.24	15.88	0.575	0.600	0.625
L1	2.28	2.54	2.80	0.090	0.100	0.110
L2		1.30	2.92		0.051	0.115
L3	1.27	1.52	1.78	0.050	0.060	0.070

(3) TO252-3L

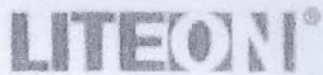


Land Pattern Recommendation (Unit : mm)


Notes:

1. JEDEC Outline: TO-252 AB
2. Mils suggested for positive contact at mounting

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.38	0.086	0.090	0.094
A1	1.08	1.15	1.32	0.043	0.045	0.052
b	0.64		0.78	0.025		0.031
b2	5.23	5.35	5.43	0.206	0.211	0.214
C	0.51TYP.			0.020TYP.		
C1	0.46	0.52	0.58	0.018	0.020	0.023
D	5.33	5.57	5.80	0.210	0.219	0.228
E	6.38	6.58	6.68	0.251	0.259	0.263
e	2.24		2.34	0.088		0.092
e1	4.48		4.68	0.176		0.184
H	9.00	9.70	10.40	0.354	0.382	0.409
L	0.51			0.020		
L1	0.65	0.83	0.95	0.026	0.033	0.037
L2	1.52	1.78	2.03	0.060	0.070	0.080



Liteon Semiconductor Corporation

LSP1084

5A Low Dropout Linear Regulator

■ UPDATE HISTORY

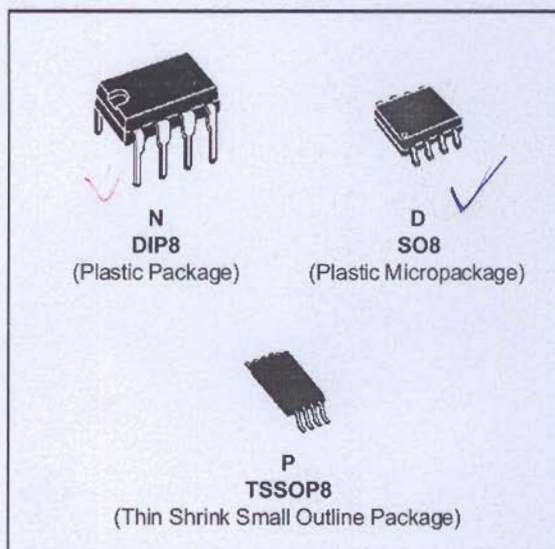
Date	Version	Descriptions
20090420	Rev1.1	Revise LSP1084's temperature grade from 0~70°C to -20~125°C (By Fredwu)



MC4558

WIDE BANDWIDTH DUAL BIPOLAR OPERATIONAL AMPLIFIERS

- INTERNALLY COMPENSATED
- SHORT-CIRCUIT PROTECTION
- GAIN AND PHASE MATCH BETWEEN AMPLIFIERS
- LOW POWER CONSUMPTION
- PIN TO PIN COMPATIBLE WITH MC1458/LM358
- GAIN BANDWIDTH PRODUCT (at 100kHz) 5.5MHz



DESCRIPTION

The MC4558 is a high performance monolithic dual operational amplifier.

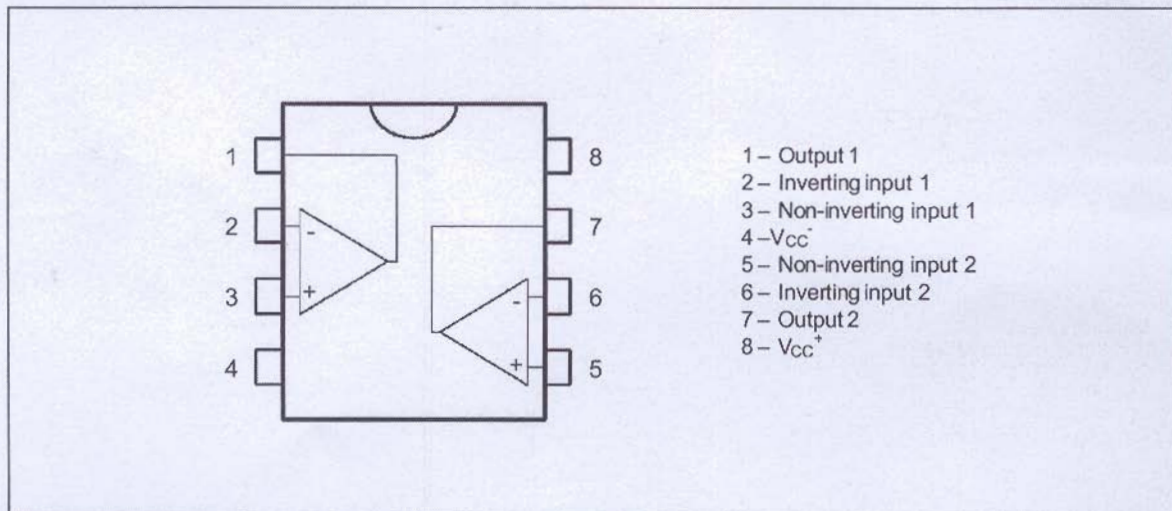
The circuit combines all the outstanding features of the MC1458 and, in addition, possesses three times the unity gain bandwidth of the industry standard.

ORDER CODES

Part Number	Temperature Range	Package		
		N	D	P
MC4558C	0°C, +70°C	•	•	•
MC4558I	-40°C, +105°C	•	•	•

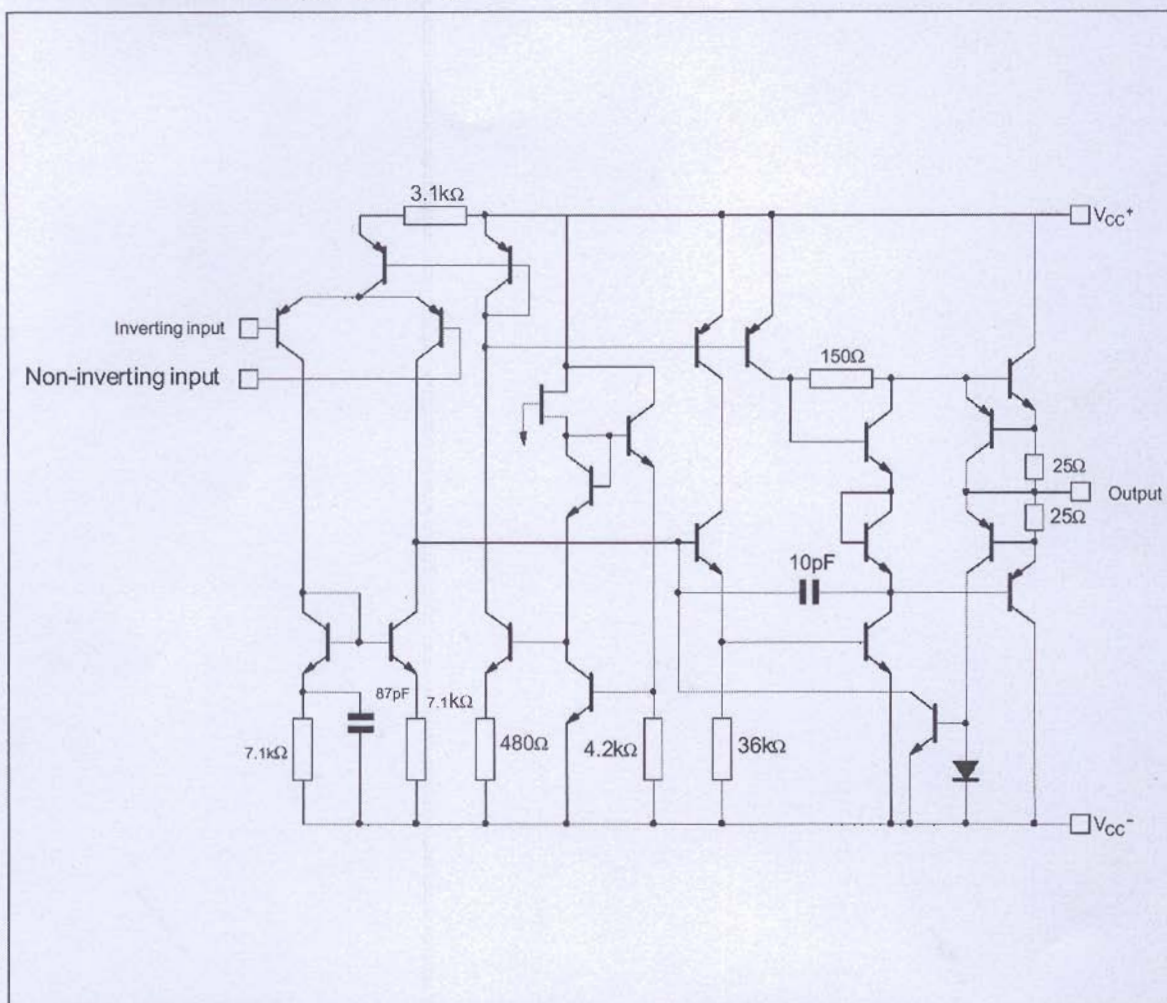
Example : MC4558CN

PIN CONNECTIONS (top view)



MC4558

SCHEMATIC DIAGRAM (1/2 MC4558)



ABSOLUTE MAXIMUM RATINGS

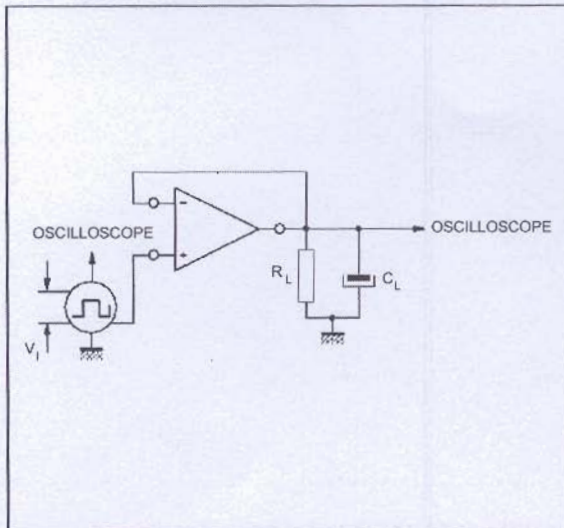
Symbol	Parameter	MC4558I	MC4558C	Unit
V_{CC}	Supply Voltage	± 22	± 22	V
V_i	Input Voltage	± 15	± 15	V
V_{id}	Differential Input Voltage	± 30	± 30	V
P_{tot}	Power Dissipation	680	680	mW
	Output Short-circuit Duration	Infinite		
T_{oper}	Operating Free-air Temperature Range	-40 to +105	0 to +70	°C
T_{stg}	Storage Temperature Range	-65 to +150	-65 to +150	°C

ELECTRICAL CHARACTERISTICS

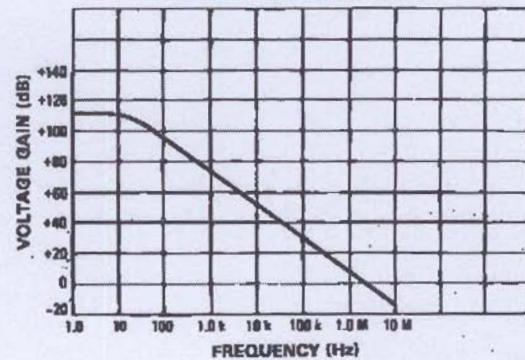
 $V_{CC} = \pm 15V$, $T_{amb} = 25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage ($R_s \leq 10\text{ k}\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		1	5 6	mV
I_{io}	Input Offset Current $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		20	100 200	nA
I_{ib}	Input Bias Current $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		50	400 500	nA
A_{vd}	Large Signal Voltage Gain ($V_o = \pm 10V$, $R_L = 2\text{ k}\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio ($R_s \leq 10\text{ k}\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	77 77	90		dB
I_{cc}	Supply Current, all Amp, no Load $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		2.3	4.5 6	mA
V_{icm}	Input Common Mode Voltage Range $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	± 12 ± 12			V
CMR	Common-mode Rejection Ratio ($R_s \leq 10\text{ k}\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	70 70	90		dB
I_{os}	Output Short-circuit Current	10	20	40	mA
V_o	Output Voltage Swing $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	$R_L = 10\text{ k}\Omega$ $R_L = 2\text{ k}\Omega$ $R_L = 10\text{ k}\Omega$ $R_L = 2\text{ k}\Omega$ ± 12 ± 10 ± 12 ± 10	± 14 ± 13		V
SR	Slew Rate ($V_i = \pm 10V$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$, $T_{amb} = 25^{\circ}C$, unity gain)	1.5	2.2		V/ μ s
t_r	Rise Time ($V_i = \pm 20\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$, $T_{amb} = 25^{\circ}C$, unity gain)		0.3		μ s
Kov	Overshoot ($V_i = \pm 20\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$, $T_{amb} = 25^{\circ}C$, unity gain)		15		%
R_i	Input Resistance	0.3	2		M Ω
C_i	Input Capacitance		1.4		pF
R_o	Output Resistance		75		Ω
B	Unity Gain Bandwidth		2.8		MHz
GBP	Gain Bandwidth Product ($V_i = 10\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$, $f = 100\text{ kHz}$, $T_{amb} = 25^{\circ}C$)		5.5		MHz
THD	Total Harmonic Distortion ($f = 1\text{ kHz}$, $A_v = 20\text{ dB}$, $R_L = 2\text{ k}\Omega$, $V_o = 2V_{pp}$, $C_L = 100\text{ pF}$, $T_{amb} = 25^{\circ}C$)		0.008		%
e_n	Equivalent Input Noise Voltage ($f = 1\text{ kHz}$, $R_s = 100\Omega$)		12		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$
V_{O1}/V_{O2}	Channel Separation		120		dB

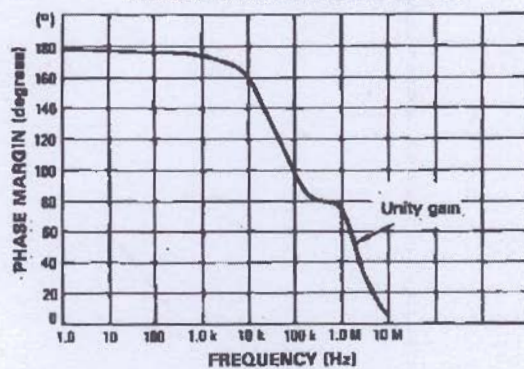
TRANSIENT RESPONSE TEST CIRCUIT



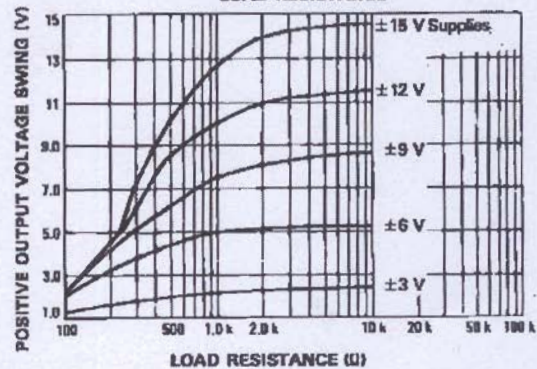
OPEN LOOP FREQUENCY RESPONSE



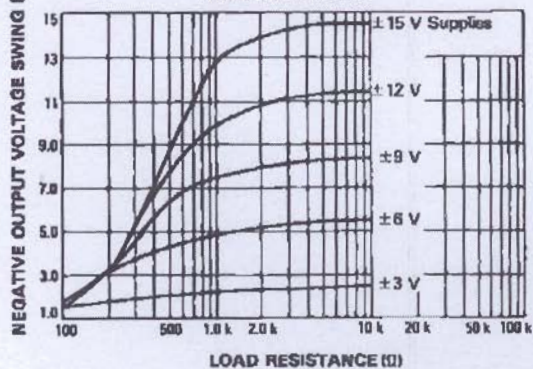
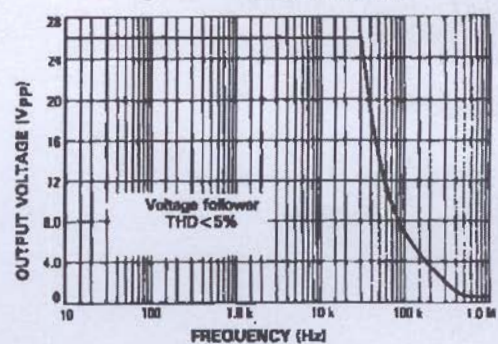
PHASE MARGIN VERSUS FREQUENCY



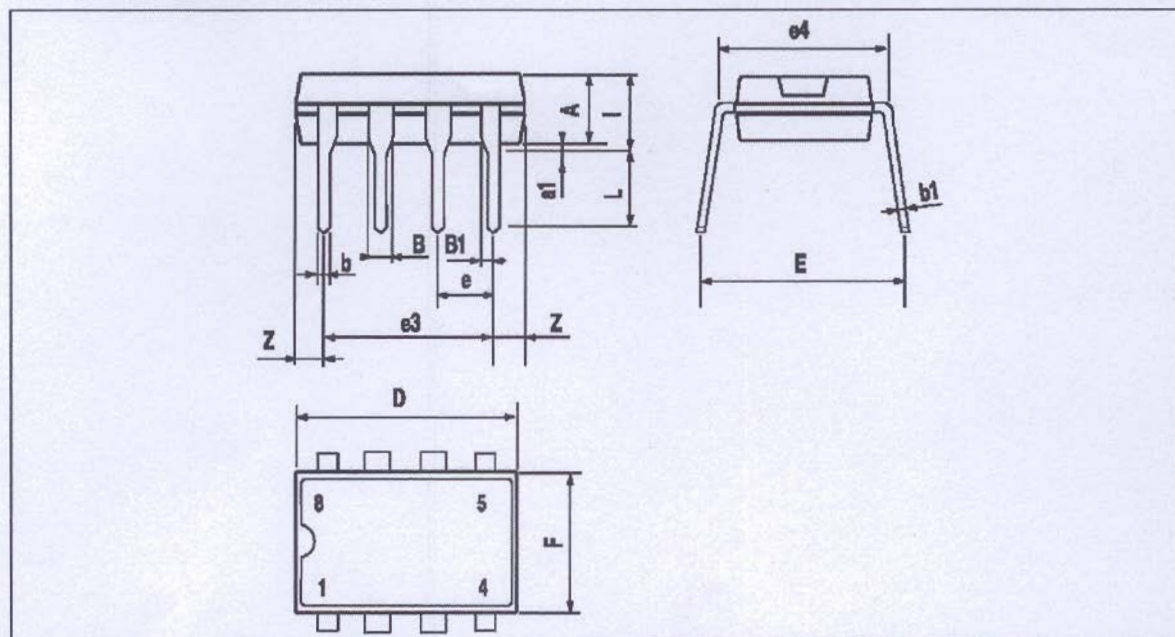
POSITIVE OUTPUT VOLTAGE SWING VERSUS LOAD RESISTANCE



NEGATIVE OUTPUT VOLTAGE SWING VERSUS LOAD RESISTANCE

POWER BANDWIDTH
(Large signal swing versus frequency)

PACKAGE MECHANICAL DATA
8 PINS – PLASTIC DIP

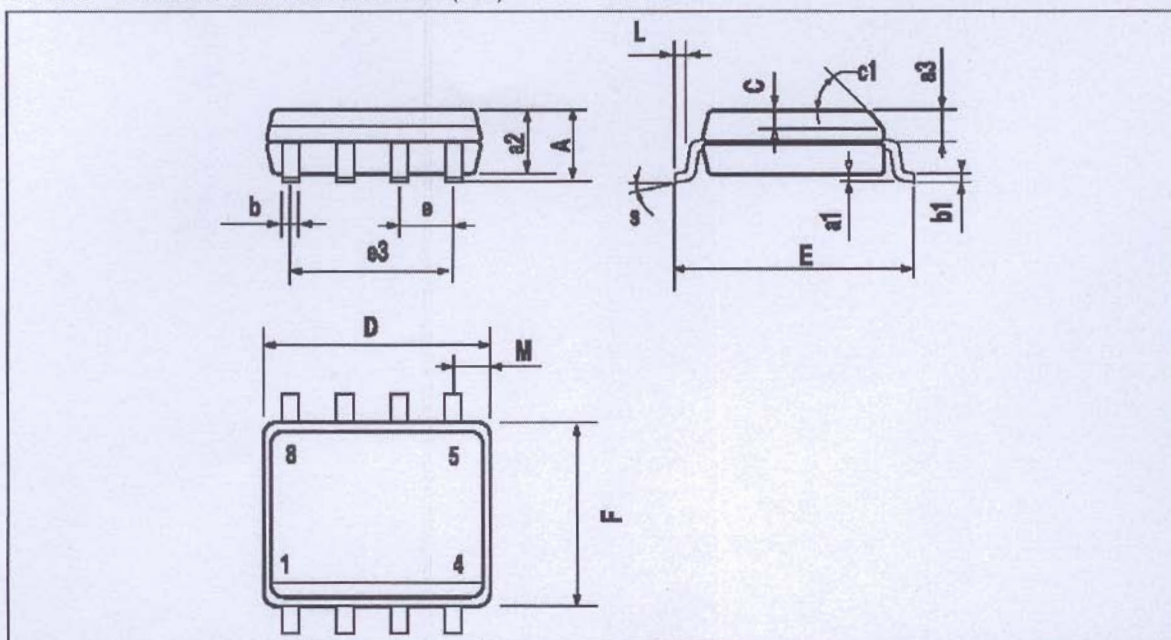


Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

MC4558

PACKAGE MECHANICAL DATA

8 PINS – PLASTIC MICROPACKAGE (SO)

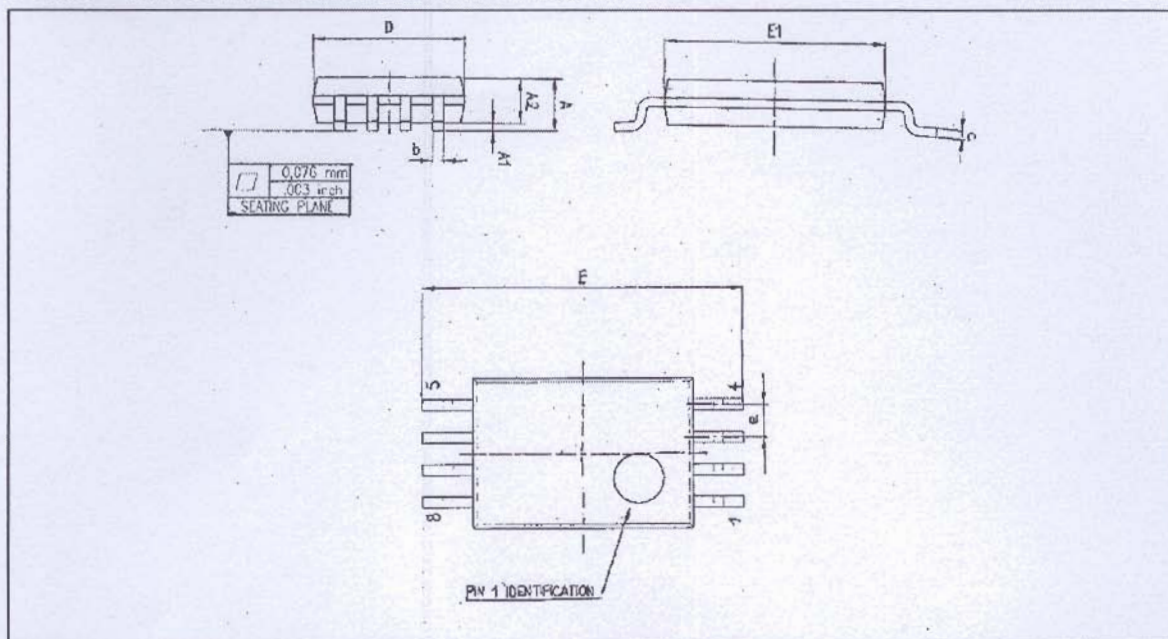


PM-S08 EFS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

S08 TEL

PACKAGE MECHANICAL DATA
8 PINS – THIN SHRINK SMALL OUTLINE PACKAGE



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.05
A1	0.05		0.15	0.01		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.15
c	0.09		0.20	0.003		0.012
D	2.90	3.00	3.10	0.114	0.118	0.122
E		6.40			0.252	
E1	4.30	4.40	4.50	0.169	0.173	0.177
e		0.65			0.025	
k	0°		8°	0°		8°
l	0.50	0.60	0.75	0.09	0.0236	0.030

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ORDER CODE :

DATA SHEET

TDA1517; TDA1517P **2 x 6 W stereo power amplifier**

Product specification
Supersedes data of 2002 Jan 17

2004 Feb 18

2 x 6 W stereo power amplifier**TDA1517; TDA1517P****FEATURES**

- Requires very few external components
- High output power
- Fixed gain
- Good ripple rejection
- Mute/standby switch
- AC and DC short-circuit safe to ground and V_P
- Thermally protected
- Reverse polarity safe
- Capability to handle high energy on outputs ($V_P = 0$ V)
- No switch-on/switch-off pop
- Electrostatic discharge protection.

GENERAL DESCRIPTION

The TDA1517 is an integrated class-B dual output amplifier in a plastic single in-line medium power package with fin (SIL9MPF), a plastic rectangular-bent single in-line medium power package with fin (RBS9MPF) or a plastic heat-dissipating dual in-line package (HDIP18). The device is primarily developed for multi-media applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_P	supply voltage		6.0	14.4	18.0	V
I_{ORM}	repetitive peak output current		—	—	2.5	A
$I_{q(tot)}$	total quiescent current		—	40	80	mA
I_{sb}	standby current		—	0.1	100	μ A
I_{sw}	switch-on current		—	—	40	μ A
$ Z_i $	input impedance		50	—	—	k Ω
P_o	output power	$R_L = 4 \Omega$; THD = 0.5%	—	5	—	W
		$R_L = 4 \Omega$; THD = 10%	—	6	—	W
SVRR	supply voltage ripple rejection	$f_i = 100$ Hz to 10 kHz	48	—	—	dB
α_{cs}	channel separation		40	—	—	dB
G_v	closed loop voltage gain		19	20	21	dB
$V_{no(rms)}$	noise output voltage (RMS value)		—	50	—	μ V
T_c	crystal temperature		—	—	150	$^{\circ}$ C

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
TDA1517/N3	SIL9MPF	plastic single in-line medium power package with fin; 9 leads	SOT110-1
TDA1517/N3/S5	RBS9MPF	plastic rectangular-bent single in-line medium power package with fin; 9 leads	SOT352-1
TDA1517P	HDIP18	plastic heat-dissipating dual in-line package; 18 leads	SOT398-1

2 x 6 W stereo power amplifier

TDA1517; TDA1517P

BLOCK DIAGRAM

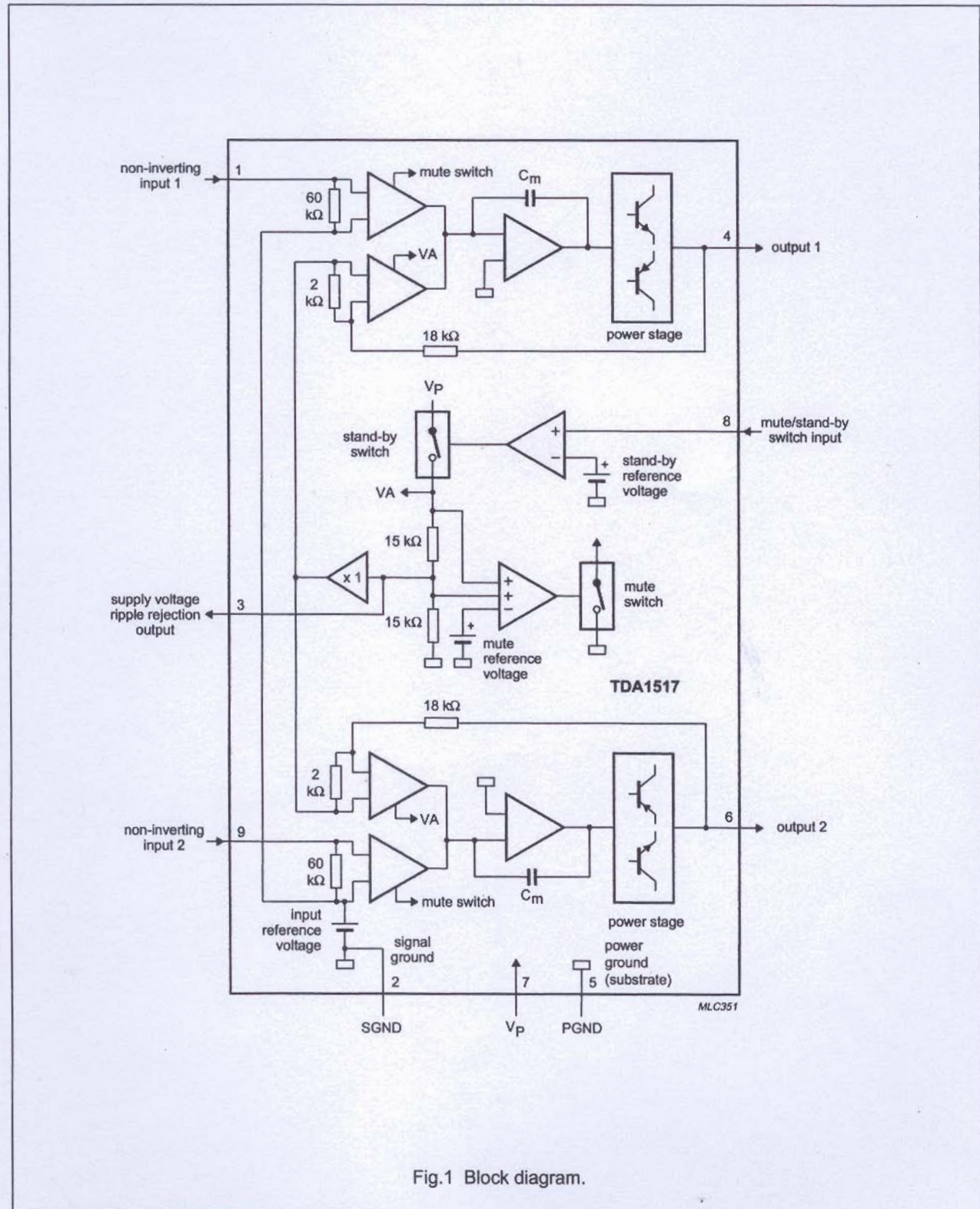


Fig.1 Block diagram.

2 x 6 W stereo power amplifier

TDA1517; TDA1517P

PINNING

SYMBOL	PIN	DESCRIPTION
-INV1	1	non-inverting input 1
SGND	2	signal ground
SVRR	3	supply voltage ripple rejection output
OUT1	4	output 1
PGND	5	power ground
OUT2	6	output 2
V _P	7	supply voltage
M/SS	8	mute/standby switch input
-INV2	9	non-inverting input 2

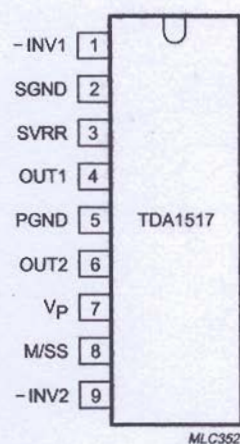
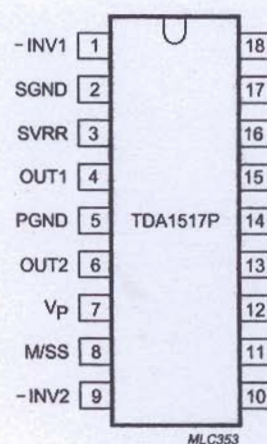


Fig.2 Pin configuration for SOT110-1 and SOT352-1.



Pins 10 to 18 should be connected to GND or floating.

Fig.3 Pin configuration for SOT398-1.

FUNCTIONAL DESCRIPTION

The TDA1517 contains two identical amplifiers with differential input stages. The gain of each amplifier is fixed at 20 dB. A special feature of the device is the mute/standby switch which has the following features:

- Low standby current (<100 μ A)
- Low mute/standby switching current (low cost supply switch)
- Mute condition.

2 x 6 W stereo power amplifier

TDA1517; TDA1517P

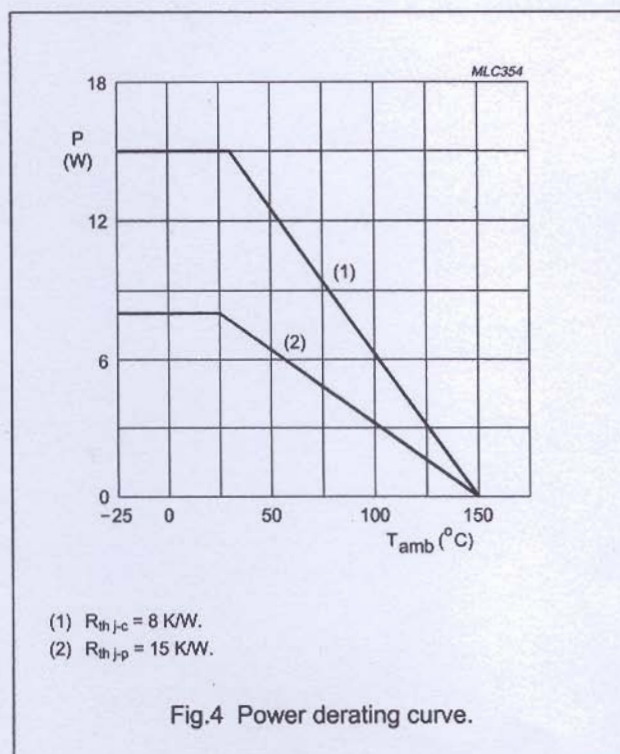
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_P	supply voltage	operating	—	18	V
		no signal	—	20	V
$V_{P(sc)}$	AC and DC short-circuit safe voltage		—	18	V
$V_{P(r)}$	reverse polarity		—	6	V
ERG_O	energy handling capability at outputs	$V_P = 0$ V	—	200	mJ
I_{OSM}	non-repetitive peak output current		—	4	A
I_{ORM}	repetitive peak output current		—	2.5	A
P_{tot}	total power dissipation	see Fig.4	—	15	W
T_{stg}	storage temperature		−55	+150	°C
T_{amb}	operating ambient temperature		−40	+85	°C
T_c	crystal temperature		—	150	°C

THERMAL RESISTANCE

SYMBOL	TYPE NUMBER	PARAMETER	VALUE	UNIT
$R_{th(j-c)}$	TDA1517/N3; TDA1517/N3/S5	thermal resistance from junction to case	8	K/W
$R_{th(j-p)}$	TDA1517P	thermal resistance from junction to pins	15	K/W
$R_{th(j-a)}$	TDA1517/N3; TDA1517/N3/S5; TDA1517P	thermal resistance from junction to ambient	50	K/W



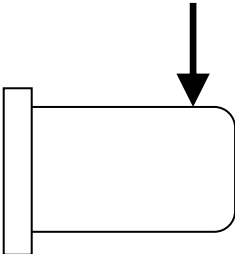
TENA ELECTRONICS Co.,Ltd. 特纳电子		PRODUCT SPECIFICATION 产品规格说明书	型号/MODEL TNF931D BFDR1B	页码/PAGE 2
		描述/DESCRIPTION 中频 IF 38.90		
NO.	项目/ITEM	规格/SPECIFICATION		
1.	概要/GENERAL	The TNF931D BFDR1B tuner belongs to the TNF93XD family of tuners, which are designed to meet a wide range of applications. SYSTEM: B/G, D/K, I, H,L/L'		
1.1	调谐系统/Tuning System	FS with I ² C PLL, DC-DC inside		
1.2	接收制式/Receiving System	Standard system with hyper band		
1.3	接收频道 /Receiving Channels	VHF Low : 44.25 ~ 142.25MHz VHF High : 145.25 ~ 424.25MHz UHF : 430.25 ~ 863.25MHz		
1.4	中频频率/Intermediate Frequency	System : IF Picture : 38.90 Color : 34.47 Sound : 33.40		
1.5	天线输入阻抗/	VHF/UHF : 75 ohm unbalanced		
1.6	Antenna Input Impedance	75 ohm unbalanced		
1.7	输出阻抗/Output Impedance	Approximate: 40 grams		
1.8	重量/Weight 连接端子/Connection	Antenna : IEC jack CONNECTOR		
1.9	操作温度/Operating Temp 储藏温度/Storage Temp	U/V INPUT TUINER TO TV IF		
1.10		-15℃to+70℃(standard+25℃) -20℃to+80℃(standard+25℃)		

特纳电子 TENA ELECTRONICS Co.,Ltd.		PRODUCT SPECIFICATION 产品规格说明书		型号/MODEL	页码/PAGE																																																																																		
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	<table><tr><td colspan="2">TERMINAL NAME</td><td>SPECIFICATION</td><td colspan="2">UNIT/DC</td></tr><tr><td rowspan="2">Maximum Supply Voltage</td><td>BM/BP</td><td>5.5</td><td colspan="2">V</td></tr><tr><td>AGC</td><td>4.5</td><td colspan="2">V</td></tr></table>					TERMINAL NAME		SPECIFICATION	UNIT/DC		Maximum Supply Voltage	BM/BP	5.5	V		AGC	4.5	V																																																																					
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<table><tr><td colspan="2" rowspan="2">Terminals</td><td colspan="3">Standard Voltage(V)</td><td>Load Current</td></tr><tr><td>VHF Low</td><td>VHF High</td><td>UHF</td><td>Typ.</td></tr><tr><td>1</td><td>AGC</td><td>4.0</td><td>4.0</td><td>4.0</td><td>20uA</td></tr><tr><td>2</td><td>VT</td><td>NOT USED</td><td></td><td></td><td></td></tr><tr><td>3</td><td>AS</td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td>SCL</td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td>SDA</td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td>NC</td><td>---</td><td>---</td><td>---</td><td>---</td></tr><tr><td>7</td><td>BM</td><td>5.0</td><td>5.0</td><td>5.0</td><td>95mA</td></tr><tr><td>8</td><td>ADC</td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td>NC</td><td>---</td><td>---</td><td>---</td><td>---</td></tr><tr><td>10</td><td>NC</td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td>IF</td><td>IF OUT</td><td></td><td></td><td></td></tr><tr><td>A</td><td>U/V-ANT</td><td></td><td></td><td></td><td></td></tr></table>						Terminals		Standard Voltage(V)			Load Current	VHF Low	VHF High	UHF	Typ.	1	AGC	4.0	4.0	4.0	20uA	2	VT	NOT USED				3	AS					4	SCL					5	SDA					6	NC	---	---	---	---	7	BM	5.0	5.0	5.0	95mA	8	ADC					9	NC	---	---	---	---	10	NC					11	IF	IF OUT				A	U/V-ANT				
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特纳电子 TENA ELECTRONICS Co.,Ltd.		PRODUCT SPECIFICATION 产品规格说明书			型号/MODEL		页码/PAGE	
					TNF931D BFDR1B		4	
					描述/DESCRIPTION			
		中频 IF 38.90						
NO.	项目/ITEM	规格/SPECIFICATION						NOTES
2.1	幅频特性曲线 AMPLITUDE RESPONSE		Min	Typ	Max	Unit	Condition	
					4	dB	Tilt of PC to top of curve	
					7		Tilt of SC to top of curve	
2.2	驻波系数 VSWR	VHF Low		5	7	DB	The worst point between fp and fs	
		VHF High		5	7			
		UHF		5	6			
2.3	功率增益 Power Gain	VHF Low	30	33		DB	GR=0	
		VHF High	28	32				
		UHF	30	35				
2.4	增益变化 Gain Variation	VHF Low		8	12	DB		
		VHF High		8	12			
		UHF		8	10			
2.5	增益衰减量 Gain Reduction	VHF Low	35	50		DB	When AGC voltage is fluctuated from 4.0V~0V	
		VHF High	35	50				
		UHF	35	40				
2.6	镜像抑制比 Image Rejection	VHF Low	50	60		DB	GR=0	
		VHF High	50	60				
		UHF	45	58				
2.7	中频抑制比 IF Rejection	VHF Low	50	60		DB	GR=0	
		VHF High	65	80				
		UHF	65	80				
2.8	噪声系数 Noise Figure	VHF Low		8	10	DB	GR=0	
		VHF High		7	9			
		UHF		8	10			

特纳电子		PRODUCT SPECIFICATION		型号/MODEL		页码/PAGE		
TENA ELECTRONICS Co.,Ltd.		产品规格说明书		TNF931D BFDR1B		5		
				描述/DESCRIPTION				
				中频 IF 38.90				
NO.	项目/ITEM	规格/SPECIFICATION						NOTES
2.9	带内交扰调制 Cross Modulation -In band: Low band(n+/-2)		Min	Typ	Max	Unit	Condition	Spectrum-analyzer method 1KHz,30%Modulation
			75			dBu	GR=0	
			75			dBu		
2.10	彩色条拍打 Color Beat			50	70	dB		
2.11	输入端子辐射 ANT Radiation	0~1GHz			46	dBu	75Ω Terminate	
		1~1.75GHz			54			
2.12	中频端子泄露 IF Leakage	VHF-Low			80			
		VHF-High			80	dBu	75Ω Terminate	
		UHF			80			
2.13	电压引起本振 频率的变化 OSC instability				50	KHz	B +/-5%	
2.14	本振停振电压 OSC stop Votage				4.5	V	B Voltage	

特纳电子 TENA ELECTRONICS Co.,Ltd.		PRODUCT SPECIFICATION 产品规格说明书	型号/MODEL TNF931D BFDR1B 描述/DESCRIPTION 中频 IF 38.90	页码/PAGE 6
NO.	项目/ITEM	规格/SPECIFICATION		
2.15	差拍干扰抑制比 BEAT INTERFERENCE REJECTION RATIO	5CH:45dB 6CH:42dB A- 5CH:42dB		
2.16	最大输入电平 THE MAXINPUT SIGNAL LEVEL	All band:110dBμ V Max		
2.17	频率覆盖余量 Margin Frequency	All band vt (0.5v-28v) +/-2MHz Min		
2.18	调谐电压范围 Tuning cover range	VT range:0.3v-30v		
2.19	本振频率温度漂移 Temperature Drift(osc)	Temperature 25℃ ± 30℃ VHF:-80KHz~+80KHz UHF:-100KHz~+100KHz		
2.20	输入信号漂移 Input signal drift	All band range:+/-70KHz		
2.21	环境测试 Environment Test			
	2.21.1 高温实验 Heat Load test	in 70° ±2° C for 96±5 hrs, and in standard test for 30 min, then take measurement within 1 hour. Supply: STD +10%, supply voltage cycle:1.5 H On, 0.5 H Off;		
	2.21.2 湿度实验 Humidity Load test	in 40° ±5° for 24±2 hrs, in STD test for 30 min, then take meas. in 40° ±2° C, 90~95% RH for 96±5 hrs, and in STD test for 30 min than take meas. Within 1 hrs. Supply voltage: STD+10%, cycle 1.5H ON, 0.5 H off, Leave in -20° ±2° C for 96±5 hrs and in, STD test for 2hrs,		
	2.21.3 低温测试 Cold test	Leave sample for 1000hrs, then meas.		
	2.21.4 使用寿命测试 Life test	±8KV, 10 times, charge cap. 150pF, series. 330W,		
	2.21.5 防静电测试 ESD test (contact)	amplitude 1mm, 10~55Hz for 40 min in X, Y, Z direction,		
	2.21.6 振动测试 Vibration test	After 2.21.1-2.21.6 test, the electrical characteristics: noise change :+/-3dB MAX, power gain change:+/-3dB MAX, freq drift:+80KHz MAX		
	Result:			

TENA ELECTRONICS Co.,Ltd. 特纳电子		PRODUCT SPECIFICATION 产品规格说明书	型号/MODEL TNF931D BFDR1B 页码/PAGE 7 描述/DESCRIPTION 中频 IF 38.90
3.	机械特性 MECHANICAL AND CONSTRUCTION CHARACTERISTICS		
3.1	端子插拔力 Holding Strength of ANT Jack	Initlal Inserting Force : Max 5.0Kg Extracting Force After 5 Cyclc: Min . 0.7 Kg	
3.2	端子强度 Terminal Strength	Vertical Direction : Min 2 Kg Folding-Strength : The terminals must not be damaged when bent left and right up to 45 ,4 time.	
3.3	IEC 插口破坏性强度 Destructive Strength of IEC Connector	Shall stand the force up to 15Kgf applied to the end  IEC connector	
3.4	PCB 孔位尺寸 Recommended Hole for P.C.B.	PAGE 9 FEATURES SIZE	

4. PLL 性能/PLL Characteristics (I²C-BUS Data Format)

4.1 写入数据格式/Write Data Format:

Byte	Msb							Lsb	Ack
Address	1	1	0	0	0	MA1	MA0	0	A
Freq. Data	0	N14	N13	N12	N11	N10	N9	N8	A
Freq. Data	N7	N6	N5	N4	N3	N2	N1	N0	A
Control byte	1	CP	0	0	1	R1	R0	0	A
Band Switch	*	*	*	*	BS4	BS3	BS2	BS1	A

(*) Don't Care

4.1.1 N14 to N0: Programmable divider dit

$$N=N14*2^{14}+N13*2^{13}+N12*2^{12}+.....+N1*2+N0$$

4.1.2 CP: Charge-Pump Current

CP=1 : High Current

4.1.3 波段切换数据/Band Switch by Byte

Band	BS4	BS3	BS2	BS1
VHF Low	0	*	0	1
VHF High	0	*	1	0
UHF	*	1	0	0
UHF	1	*	0	0

4.1.4 Locked OSC Frequency

$$f_{OSC}=fr*8*N \quad fr : \text{Reference Frequency}$$

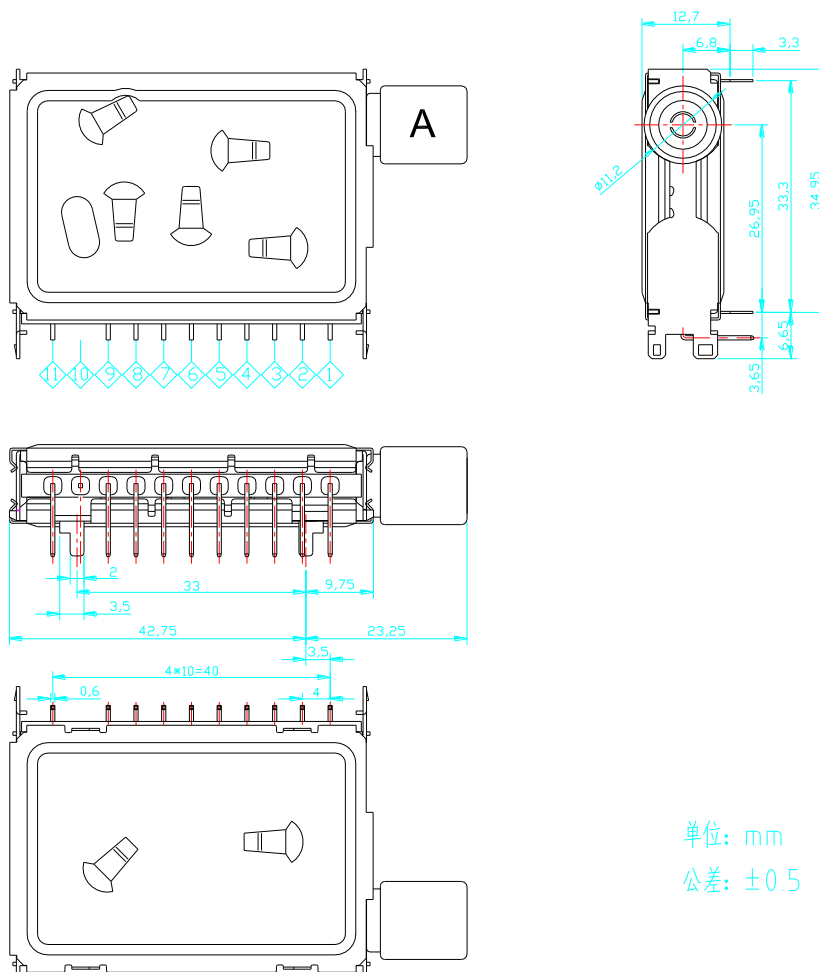
(4.0MHz/640=6.25KHz, 4.0MHz/512=7.8125KHz, 4.0MHz/1024=3.90625KHz)

4.1.5 地址选择/Address Selection

MA1	MA0	V input on AS Pin
0	0	0 to 0.1 Vcc
0	1	0.2 Vcc to 0.3 Vcc
1	0	0.4 Vcc to 0.6 Vcc
1	1	0.9 Vcc to Vcc

4.1.6 分频比率参考/Reference Divider Ratio

R1	R0	Reference Divider	Frequency Step
0	1	1024	31.25KHz
1	1	512	62.5KHz
*	0	640	50.0KHz



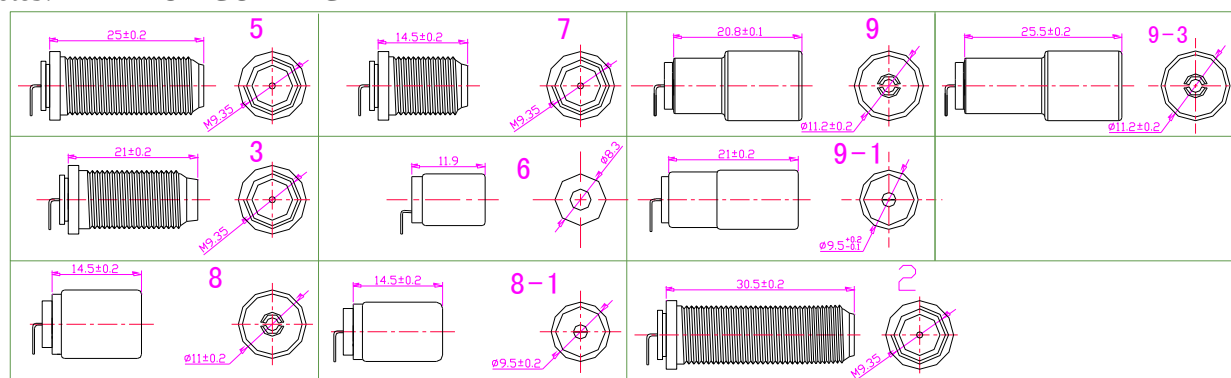
单位: mm
公差: ± 0.5

Note1: RF INPUT(A) USE '9'

Note2:

PIN	1	2	3	4	5	6	7	8	9	10	11
Name	AGC	TU	AS/CE	SCL	SDA	4MHZ OUT	VCC	ADC	NC	NC	IF

Note3: RF INPUT CONNECT



深圳市特纳电子有限公司

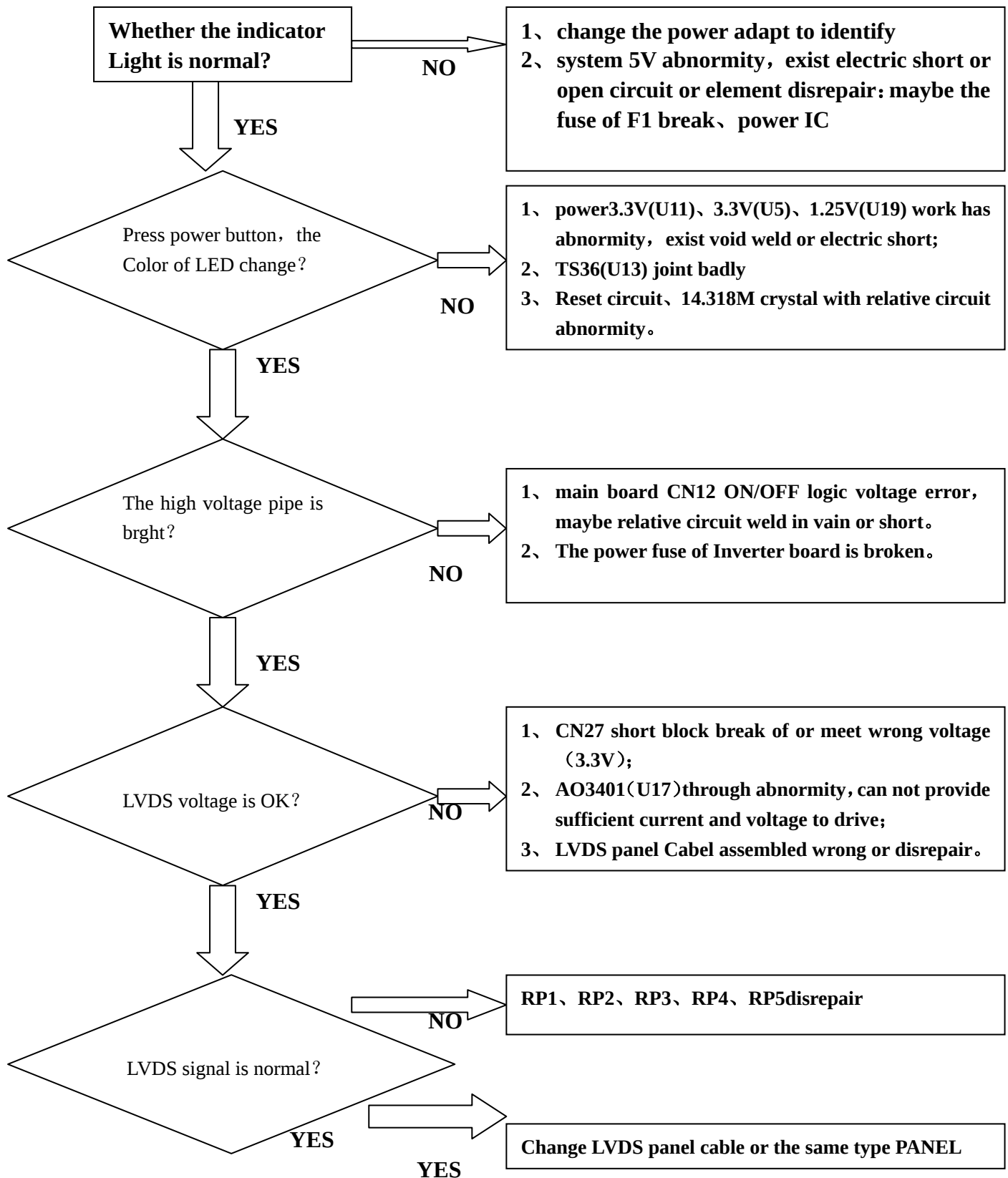
地址: 深圳市宝安区林果科学研究所 17 栋

电话: 0755-27497651 27497647 传真: 0755-27497650

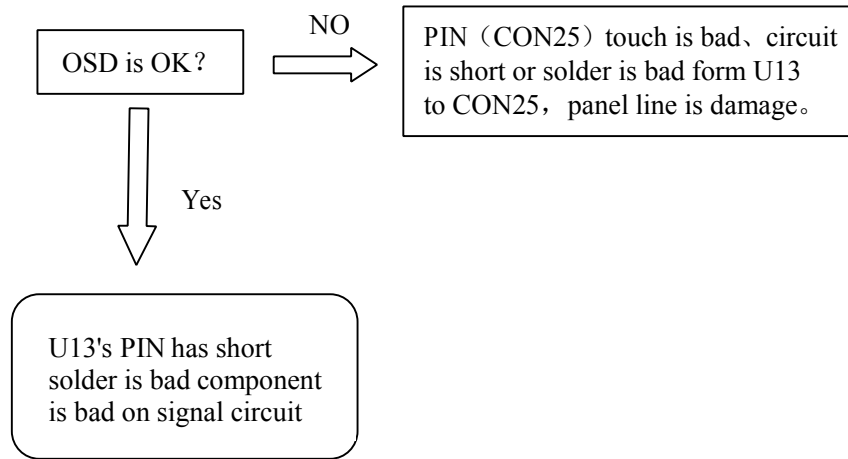
<http://www.tenas.net/> E-mail: tenas@tenas.net

TS36 TV Main board service explain

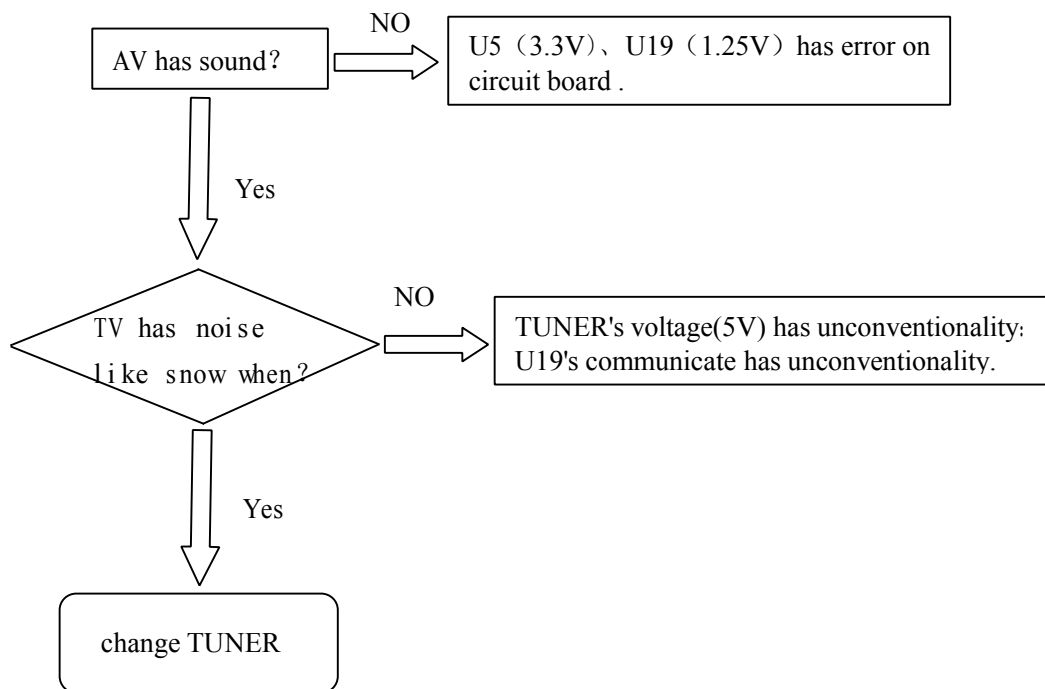
Trouble:biack screen



Trouble 2: U1's PIN has short solder is bad
component is bad on signal circuit



Trouble 3: can't incept TV(AV) signal



Trouble 4: TV(AV) no sound

