

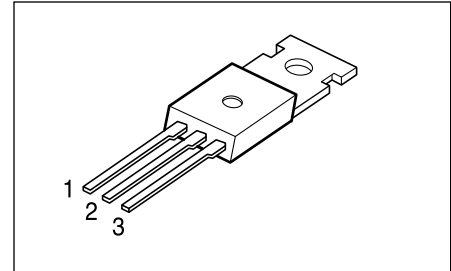
15. Main components specifications

1) REGULATOR

3-TERMINAL 1A POSITIVE VOLTAGE REGULATORS

The MC78XX/MC78XXA series of three-terminal positive regulators are available in the TO-220 package and with several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents. MC78XXI is characterized for operation from -40°C to +125°C, and MC78XXC from 0°C to +125°C

TO-220 1 2 3 1 : Input 2 : GND 3 : Output



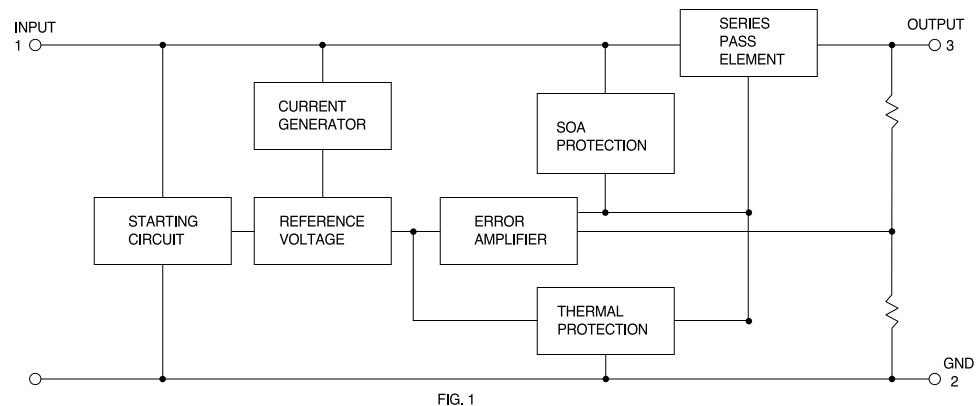
FEATURES

- UOutput Current up to 1.5A
- UOutput voltages of 5;6;8;9;10;11;12;15;18;24V
- UThermal Overload Protection
- UShort Circuit Protection
- UOutput Transistor SOA Protection
- UNo external components required
- UOutput current in excess of 1A
- UIndustrial and commercial temperature range

ORDERING INFORMATION

Device	Package	Operating Temperature
MC78XXCT	TO-220	0~+125°C
MC78XXACT	TO-220	
MC78XXT	TO-220	-40~+125°C

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Input Voltage (for $V_o = 5V$ to $18V$)	V_{IN}	35	V
(for $V_o = 24V$)	V_{IN}	40	V
Thermal Resistance Junction - Cases	θ_{JC}	5	°C/W
Thermal Resistance Junction - Air	θ_{JA}	65	q/W
Operating Temperature Range MC78XXC/AC	T_{opr}	0 ~ +125	°C
MC78XXI		-40 ~ +125	°C
Storage Temperature Range	T_{stg}	-65 ~ +150	°C

2) REGULATOR(MC7812C)

ELECTRICAL CHARACTERISTICS MC7812

(Refer to test circuit, $T_{min} < T_i < T_{max}$, $V_i = 500mA$, $V_i = 19V$, $C_i = 0.33\mu F$, $C_o = 1.0\mu F$ unless otherwise specified)

Characteristic	Symbol	Test Conditions	MC7805C			Unit
			Min	Typ	Max	
Output Voltage	V_o	$T_i = 25^\circ C$	11.5	12	12.5	V
		$5.0mA \leq I_o \leq 1.0A$, $P \leq 15W$ $V_{in} = 14.5V$ to $27V$ $V_i = 15.5V$ to $27V$	11.4	12	12.6	
Line Regulation	DV_o	$T_i = 25^\circ C$ $V_i = 14.5V$ to $30V$ $V_i = 16V$ to $22V$		10	240	mV
				3.0	120	
Load Regulation	DV_o	$T_i = 25^\circ C$ $I_o = 5.0mA$ to $1.5V$ $I_o = 250mA$ to $750mA$		12	240	mV
				4.0	120	
Quiescent Current	I_d	$T_i = 25^\circ C$		5.1	8	mA
Quiescent Current Change	DI_d	$I_o = 5mA$ to $1.0A$			0.5	mA
		$V_i = 14.5V$ to $30V$			1.0	
		$V_i = 15V$ to $30V$				
Output Voltage Drift	DV_o/DT	$I_o = 5mA$		-1		mV/ $^\circ C$
Output Noise Boltage	V_n	$f = 10Hz$ to $100KHz$ $T_i = 25^\circ C$		75		μV
Ripple Rejection	RR	$f_F = 120Hz$ $V_i = 15$ to $25V$	55	71		dB
Dropout Voltage	V_D	$I_o = 1A$, $T_i = 25^\circ C$		2		V
Output Resistance	R_o	$f = 1KHz$		18		mW
Short Circuit Current	I_{sc}	$V_i = 35V$, $T_i = 25^\circ C$		250		mA
Peak Current	I_{peak}	$T_i = 25^\circ C$		2.2		A

* $T_{min} < T_i < T_{max}$

MC78XXI : $T_{min} = -40^\circ C$, $T_{max} = 125^\circ C$

MC78XXC, $T_{min} = 0^\circ C$, $T_{max} = 125^\circ C$

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulse test with low duty is used.

MC 7805 AC(T)

ELECTRICAL CHARACTERISTICS MC7805

(Refer to test circuit, $T_{min} < T_i < T_{max}$, $I_o = 500mA$, $V_i = 10V$, $C_i = 0.33\mu F$, unless otherwise specified)

Characteristic	Symbol	Test Conditions	MC7805C			Unit
			Min	Typ	Max	
Output Voltage	V_o	$T_i = 25^\circ C$	4.8	5.0	5.2	V
		$5.0mA \leq I_o \leq 1.0A$, $P_o \leq 15W$ $V_i = 7V$ to $20V$ $V_i = 8V$ to $20V$	4.75	5.0	5.25	
Line Regulation	DV_o	$T_i = 25^\circ C$ $V_i = 7V$ to $25V$ $V_i = 8V$ to $12V$		5.0	100	mV
				1.5	50	
Load Regulation	DV_o	$T_i = 25^\circ C$ $I_o = 5.0mA$ to $1.5V$ $I_o = 250mA$ to $750mA$		9	100	mV
				3	50	
Quiescent Current	I_d	$T_i = 25^\circ C$		5.0	8	mA
Quiescent Current Change	D,I_d	$I_o = 5mA$ to $1.0A$			0.5	mA
		$V_i = 7V$ to $25V$			1.3	
		$V_i = 8V$ to $25V$				
Output Voltage Drift	DV_o/DT	$I_o = 5mA$		-0.8		mV/ $^\circ C$
Output Noise Boltage	V_n	$f = 10Hz$ to $100KHz$ $T_i = 25^\circ C$		40		μV
Ripple Rejection	RR	$F = 120Hz$ $V_i = 8$ to $18V$	62	78		dB
Dropout Voltage	V_D	$I_o = 1A$, $T_i = 25^\circ C$		2		V
Output Resistance	R_o	$f = 1KHz$		17		mW
Short Circuit Current	I_{SC}	$V_i = 35V$, $T_i = 25^\circ C$		250		mA
Peak Current	I_{peak}	$T_i = 25^\circ C$		2.2		A

* $T_{min} < T_i < T_{max}$

MC78XXI : $T_{min} = -40^\circ C$, $T_{max} = 125^\circ C$

MC78XXC, $T_{min} = 0^\circ C$, $T_{max} = 125^\circ C$

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulse testint with low duty is used.

Series UDS2980H and UDS2980R hermetically sealed source drivers link standard low-power digital logic and relays, solenoids, magnetic print hammers, stepping motors, LEDs, and lamps in applications requiring separate logic and load grounds, load supply voltages to +80V, and load currents to 500 mA.

Types UDS2981H/R and UDS2983H/R are intended for use with 5v logic systems(TTL, Schottky TTL. DTL and 5V CMOS). UDS2982H/R and UDS2984H/R integrated circuits are intended for MOS interface (PMOS and CMOS) operating from supply voltages of from 6 to 16V.

Types UDS2981H/R and UDS2982H/R will withstand an output OFF voltage of 50 V. UDS2983H/R and UDS2984H/R drivers will withstand a maximum output OFF voltage of 80V.

Under normal operating conditions, the devices will sustain 50 mA continuously on each of the eight outputs at an ambient temperature of +85°C and with a supply voltage of 15V. All types include input current-limiting resistors and output transient-suppression diodes. In all cases, outputs are switched ON by an active high input level.

Note that the maximum current rating may not be obtained at -55°C because of reduced beta, or at +125°C because of package power limitations.

Series UDS2980H drivers are furnished in 18-pin ceramic/metal(side-brazed) hermetic dual in-line packages. Series UDS2980R drivers are supplied in ceramic/glass(cer-DIP) hermetic packages. Both are processed to the requirements of MIL-STD-883, Class B.

The same circuits are also available in 18-pin plastic dual in-line packages (Series UDN2980A) for operation over a limited temperature range, or where higher package power dissipation is needed.

- TTL, DTL, PMOS, or CMOS Compatible Inputs
- 500 mA Output Source Current Capability
- Transient-Protected Outputs
- High-Reliability Screening to MIL-STD-883, Class B
- Operating Temperature -55°C to +125°C

Always order by complete part number, e.g.,
See table on next page for differences between devices.

The diagram shows a 9-bit DAC circuit. It consists of a ladder network of resistors and inverters. The inputs are labeled 1 through 9, and the outputs are labeled 10 through 18. A positive supply voltage $+V_S$ is connected to the bottom output line (10). The circuit is designed to convert a 9-bit digital input into a 9-bit digital output.

Dwg No A 10243

Output Voltage Range, V_{CE}	
(UDS298t and UDS2982H/R).....	5V to 50V
(UDS2983 and UDS2984H/R).....	35V to 80V
Input Voltage, V_{in}	
(UDS2981 and UDS2983H/R).....	15V
(UDS2982 and UDS2984H/R).....	30V
Output Current, I_{out}	500 mA
Ground Terminal Current, I_{GND}	3.0A
Power Dissipation, P_D	
(any one driver).....	1.1W
(total package).....	See Graph
Operating Temperature Range, T_A	-55°C to + 125°C
Storage Temperature Range, T_s	-65°C to + 150°C

ELECTRICAL CHARACTERISTICS from -55°C to +125°C (unless otherwise specified).

Chracteristic	Symbol	Applicable Devices	Temp.	Test Conditions	Fig.	Limit
Maximum Output Leakage Current	I _{CEX}	UDS2981/82		V _{IN} = 0.25 V, V _S = 50 V	1	200 μA
		UDS2981/84		V _{IN} = 0.25V, V _S = 80 V	1	200 μA
Maximum Collector-Emitter Saturain Voltage	V _{CE(SAT)}	UDS2981/83	-55°C	V _{IN} = 2.4 V, I _{OUT} = -100 mA	2	2.0 V
				V _{IN} = 2.4 V, I _{OUT} = -200 mA	2	2.1 V
			+25°C	V _{IN} = 2.4 V, I _{OUT} = -350 mA	2	2.0 V
				V _{IN} = 2.4 V, I _{OUT} = -100 mA	2	1.8 V
			+125°C	V _{IN} = 2.4 V, I _{OUT} = -200 mA	2	1.9 V
		UDS2982/84	-55°C	V _{IN} = 5.0 V, I _{OUT} = -100 mA	2	2.0 V
				V _{IN} = 5.0 V, I _{OUT} = -200 mA	2	2.1 V
			+25°C	V _{IN} = 5.0 V, I _{OUT} = -350 mA	2	2.0 V
				V _{IN} = 5.0 V, I _{OUT} = -100 mA	2	1.8 V
			+125°C	V _{IN} = 5.0 V, I _{OUT} = -200 mA	2	1.9 V
Maximum Input Current	I _{IN(ON)}	ALL		V _{IN} = 2.4 V	3	295 μA
				V _{IN} = 3.85 V	3	600 μA
				V _{IN} = 12 V	3	2.3 mA
	I _{IN(OFF)}	UDS2981/82		V _{IN} = 0 V, V _S = 50 V	3	10 μA
		UDS2983/84		V _{IN} = 0 V, V _S = 80 V	3	10 μA
Maximum Output Source Current	I _{OUT}	UDS2981/83		V _{IN} = 2.4 V, V _{CE} = 2.2 V	2	-200 mA
		UDS2982/84		V _{IN} = 5.0 V, V _{CE} = 2.2 V	2	-200 mA
Maximum Supply Current (Outputs Open)	I _S	UDS2981	+25°C	V _{IN} = 2.4 V, V _S = 50 V	4	10 mA
		UDS2982		V _{IN} = 5.0 V, V _S = 50 V	4	10 mA
		UDS2983		V _{IN} = 2.4 V, V _S = 80 V	4	10 mA
		UDS2984		V _{IN} = 5.0 V, V _S = 80 V	4	10 mA
Maximum Turn-ON Delay Time	t _{PHL}	UDS2981/82	+25°C	V _S = 35 V, R _L = 175 W	7	2.0 μs
		UDS2983/84		V _S = 50 V, R _L = 250 W	7	2.0 μs
Maximum Turn-OFF Delay Time	t _{PHL}	UDS2981/82	+25°C	V _S = 35 V, R _L = 175 W	7	10 μs
		UDS2983/84		V _S = 50 V, R _L = 250 W	7	10 μs
Maximum Clamp Diode Leakage Current	I _R	UDS2981/82		V _{IN} = 0.25 V, V _S = 50 V	5	50 μA
		UDS2983/84		V _{IN} = 0.25 V, V _S = 80 V	5	50 μA
Maximum Clamp Diode Forward Voltage	V _F	ALL		I _F = 200 mA	6	1.75 V

*All inputs simultaneously.

**Pused test.

*Complete part number includes a terminal letter that indicates package (H = ceramic/metal side-brazed. R = ceramic/glass cer-DIP).

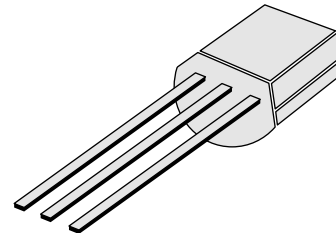
SWITCHING APPLICATION (Bias Resistor Built In)

- Switching Circuit, Inverter, Interface circuit Driver circuit.
- Built in bias Resistor ($R_1=4.7\text{KW}$, $R=10\text{KW}$)
- Complement to KSR2005

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EB0}	10	V
Collector Current	I_C	100	mA
Collector Dissipation	P_C	300	mW
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55-150	$^\circ\text{C}$

TO-92



1 Emitter 2 Collector 3 Base

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Main	Typ	Max	Unit
Collector-Base Breakdown Voltage	BV_{CBO}	$I_C=10\mu\text{A}$, $I_B=0$	50			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	$I_C=100\mu\text{A}$, $I_B=0$	50			V
Collector Cutoff Current	I_{CBO}	$V_{CB}=40\text{V}$, $I_B=0$			0.1	μA
DC Current Gain	H_C	$V_{CB}=5\text{V}$, $I_B=5\text{mA}$	30			
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=10\text{mA}$, $I_B=0.5\text{mA}$			0.3	V
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}$, $I_B=0$ $f=1\text{MHz}$		3.7		pF
Current Gain-Bandwidth Product	F_T	$V_{CB}=10\text{V}$, $I_C=5\text{mA}$		250		MHz
Input Off Voltage	$V_{I(off)}$	$V_{CB}=5\text{V}$, $I_C=100\mu\text{A}$	0.3			V
Input On Voltage	$V_{I(on)}$	$V_{CB}=0.3\text{V}$, $I_C=20\text{mA}$			2.5	V
Input Resistor	R_1		3.2	4.7	6.2	KW
Resistor Ratio	R_1/R_2		0.42	0.47	0.52	

Equivalent Circuit