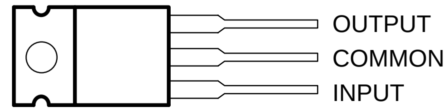
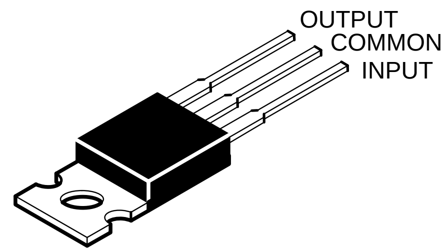
- **3-Terminal Regulators**
- **Output Current up to 500 mA**
- **No External Components**
- **Internal Thermal-Overload Protection**
- **High Power-Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**
- **Direct Replacements for Fairchild μA78M00 Series**

KC PACKAGE
(TOP VIEW)

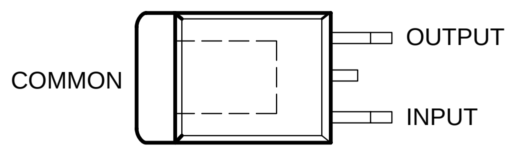


The COMMON terminal is in electrical contact with the mounting base.

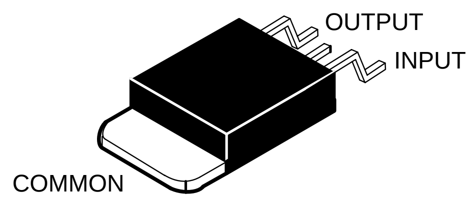
TO-220AB



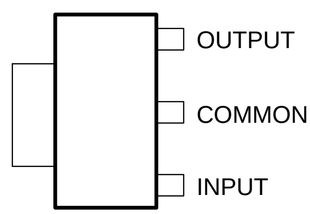
KTP PACKAGE
(TOP VIEW)



The COMMON terminal is in electrical contact with the mounting base.



DCY (SOT-223) PACKAGE
(TOP VIEW)



The COMMON terminal is in electrical contact with the mounting base.

description

This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 500 mA of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents and also as the power-pass element in precision regulators.

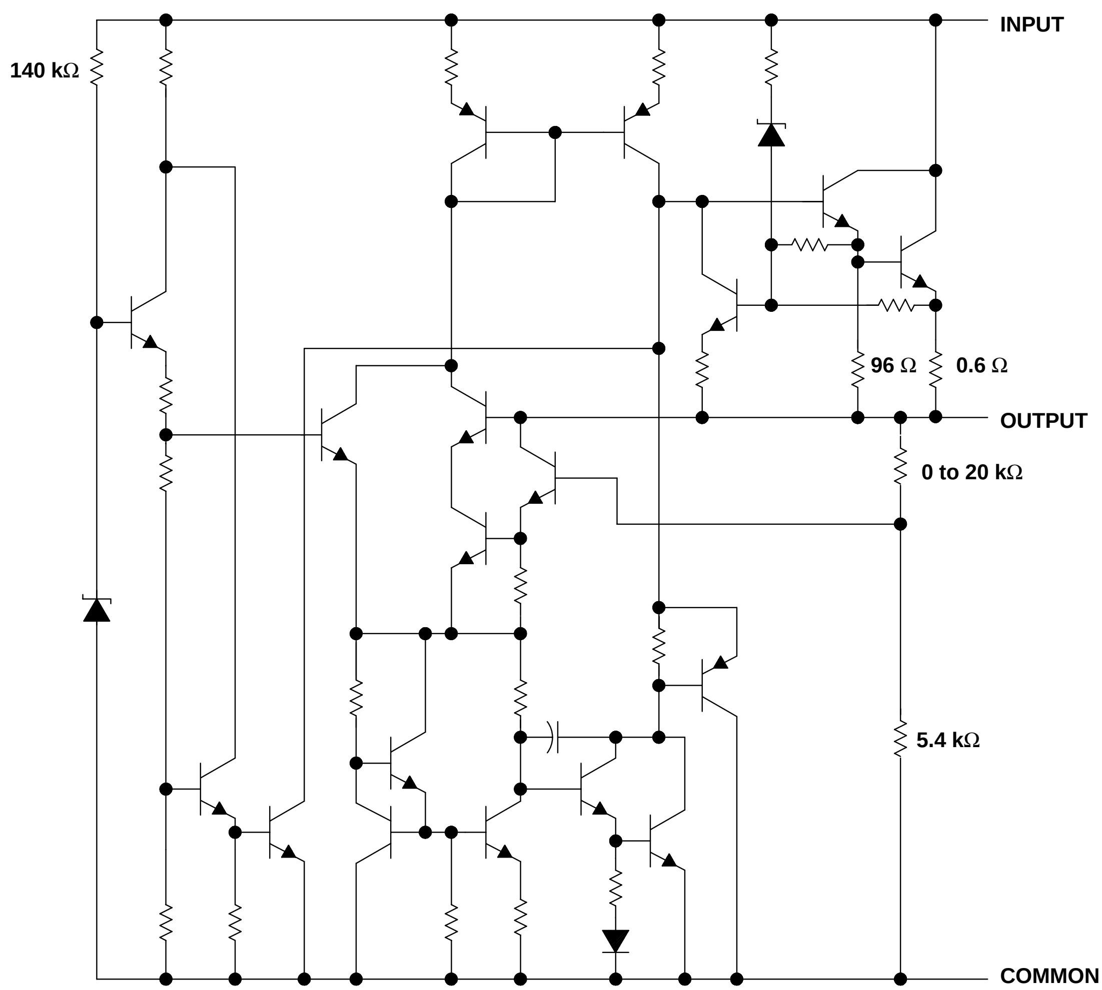
The μA78M00C series is characterized for operation over the virtual junction temperature range of 0°C to 125°C.

AVAILABLE OPTIONS

T_J	$V_{O(NOM)}$ (V)	PACKAGED DEVICES		
		SOT-223 (DCY)	HEAT-SINK MOUNTED (KC)	PLASTIC FLANGE MOUNTED (KTP)
0°C to 125°C	3.3	μA78M33CDCY	μA78M33CKC	μA78M33CKTP
	5	μA78M05CDCY	μA78M05CKC	μA78M05CKTP
	6	–	–	μA78M06CKTP
	8	μA78M08CDCY	μA78M08CKC	μA78M08CKTP
	9	–	–	μA78M09CKTP
	10	–	μA78M10CKC	μA78M10CKTP
	12	–	μA78M12CKC	μA78M12CKTP
	15	–	–	μA78M15CKTP

The KTP package is only available taped and reeled. Add the suffix R to the device type (e.g., μA78M05CKTPR). The DCY package is also available taped and reeled.

schematic



Resistor values shown are nominal.

absolute maximum ratings over virtual junction temperature range (unless otherwise noted)†

Input voltage, V_I . . . 35 V
Package thermal impedance, θ_{JA} (see Notes 1 and 2): DCY package . . . 49°C/W
(see Notes 1 and 3): KC package . . . 25°C/W
(see Notes 1 and 2): KTP package . . . 28°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . 260°C
Virtual junction temperature range, T_J . . . 0°C to 150°C
Storage temperature range, T_{stg} . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings 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-rated conditions for extended periods may affect device reliability.

NOTES:
1. Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Selecting the maximum of 150°C can affect reliability.
2. The package thermal impedance is calculated in accordance with JESD 51-5.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	MAX	UNIT
V_I	Input voltage	µA78M33	5.3	25	V
		µA78M05	7	25	
		µA78M06	8	25	
		µA78M08	10.5	25	
		µA78M09	11.5	26	
		µA78M10	12.5	28	
		µA78M12	14.5	30	
		µA78M15	17.5	30	
I_O	Output current			500	mA
T_J	Operating virtual junction temperature		0	125	°C

electrical characteristics at specified virtual junction temperature, V_I = 8 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M33C MIN	μA78M33C TYP	μA78M33C MAX	UNIT
Output voltage‡	V_I = 8 V to 20 V		3.2	3.3	3.4	V
		T_J = 0°C to 125°C	3.1	3.3	3.5	
Input voltage regulation	I_O = 200 mA	V_I = 5.3 V to 25 V		9	100	mV
		V_I = 8 V to 25 V		3	50	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	62			dB
		I_O = 300 mA	62	80		
Output voltage regulation	V_I = 8 V,	I_O = 5 mA to 500 mA		20	100	mV
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz			40	200	μV
Dropout voltage				2		V
Bias current				4.5	6	mA
Bias current change	I_O = 200 mA,	V_I = 8 V to 25 V, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C			0.5	
Short-circuit output current	V_I = 35 V			300		mA
Peak output current				700		mA

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

electrical characteristics at specified virtual junction temperature, V_I = 10 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M05C MIN	μA78M05C TYP	μA78M05C MAX	UNIT
Output voltage	V_I = 7 V to 20 V		4.8	5	5.2	V
		T_J = 0°C to 125°C	4.75		5.25	
Input voltage regulation	I_O = 200 mA	V_I = 7 V to 25 V		3	100	mV
		V_I = 8 V to 25 V		1	50	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	62			dB
		I_O = 300 mA	62	80		
Output voltage regulation	I_O = 5 mA to 500 mA			20	100	mV
	I_O = 5 mA to 200 mA			10	50	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz			40	200	μV
Dropout voltage				2		V
Bias current				4.5	6	mA
Bias current change	I_O = 200 mA,	V_I = 8 V to 25 V, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C			0.5	
Short-circuit output current	V_I = 35 V			300		mA
Peak output current				0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 11 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M06C MIN	TYP	MAX	UNIT
Output voltage	I_O = 5 mA to 350 mA,	V_I = 8 V to 21 V		5.75	6	6.25	V
			T_J = 0°C to 125°C	5.7		6.3	
Input voltage regulation	I_O = 200 mA	V_I = 8 V to 25 V			5	100	mV
		V_I = 9 V to 25 V			1.5	50	
Ripple rejection	V_I = 9 V to 19 V,	f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	59			dB
			I_O = 300 mA	59	80		
Output voltage regulation	I_O = 5 mA to 500 mA				20	120	mV
	I_O = 5 mA to 200 mA				10	60	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				45		μV
Dropout voltage					2		V
Bias current					4.5	6	mA
Bias current change	V_I = 9 V to 25 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				270		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 14 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M08C MIN	TYP	MAX	UNIT
Output voltage	V_I = 10.5 V to 23 V,	I_O = 5 mA to 350 mA		7.7	8	8.3	V
			T_J = 0°C to 125°C	7.6		8.4	
Input voltage regulation	I_O = 200 mA	V_I = 10.5 V to 25 V			6	100	mV
		V_I = 11 V to 25 V			2	50	
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	56			dB
		I_O = 300 mA		56	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	160	mV
	I_O = 5 mA to 200 mA				10	80	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				52		μV
Dropout voltage					2		V
Bias current					4.6	6	mA
Bias current change	V_I = 10.5 V to 25 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				250		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 16 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M09C MIN	μA78M09C TYP	μA78M09C MAX	UNIT
Output voltage	V_I = 11.5 V to 24 V,	I_O = 5 mA to 350 mA		8.6	9	9.4	V
			T_J = 0°C to 125°C	8.5		9.5	
Input voltage regulation	I_O = 200 mA	V_I = 11.5 V to 26 V			6	100	mV
		V_I = 12 V to 26 V			2	50	
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	56			dB
		I_O = 300 mA		56	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	180	mV
	I_O = 5 mA to 200 mA				10	90	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				58		μV
Dropout voltage					2		V
Bias current					4.6	6	mA
Bias current change	V_I = 11.5 V to 26 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				250		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 17 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M10C MIN	μA78M10C TYP	μA78M10C MAX	UNIT
Output voltage	V_I = 12.5 V to 25 V,	I_O = 5 mA to 350 mA		9.6	10	10.4	V
			T_J = 0°C to 125°C	9.5		10.5	
Input voltage regulation	I_O = 200 mA	V_I = 12.5 V to 28 V			7	100	mV
		V_I = 14 V to 28 V			2	50	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	59			dB
		I_O = 300 mA		55	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	200	mV
	I_O = 5 mA to 200 mA				10	100	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				64		μV
Dropout voltage					2		V
Bias current					4.7	6	mA
Bias current change	V_I = 12.5 V to 28 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				245		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 19 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			µA78M12C MIN	µA78M12C TYP	µA78M12C MAX	UNIT
Output voltage	V_I = 14.5 V to 27 V,	I_O = 5 mA to 350 mA		11.5	12	12.5	V
			T_J = 0°C to 125°C	11.4		12.6	
Input voltage regulation	I_O = 200 mA	V_I = 14.5 V to 30 V			8	100	mV
		V_I = 16 V to 30 V			2	50	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	55			dB
		I_O = 300 mA		55	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	240	mV
	I_O = 5 mA to 200 mA				10	120	
Temperature coefficient of output voltage	I_O = 5 mA				–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				75		µV
Dropout voltage					2		V
Bias current					4.8	6	mA
Bias current change	V_I = 14.5 V to 30 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				240		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 23 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			µA78M15C MIN	µA78M15C TYP	µA78M15C MAX	UNIT
Output voltage	V_I = 17.5 V to 30 V,	I_O = 5 mA to 350 mA		14.4	15	15.6	V
			T_J = 0°C to 125°C	14.25		15.75	
Input voltage regulation	I_O = 200 mA	V_I = 17.5 V to 30 V			10	100	mV
		V_I = 20 V to 30 V			3	50	
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	54			dB
		I_O = 300 mA		54	70		
Output voltage regulation	I_O = 5 mA to 500 mA				25	300	mV
	I_O = 5 mA to 200 mA				10	150	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				90		µV
Dropout voltage					2		V
Bias current					4.8	6	mA
Bias current change	V_I = 17.5 V to 30 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				240		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

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