78M06 THRU 78M24

3 Terminal 0.5A Positive Voltage Regulators

Description

The 78MXXseriesof three-terminal positive regulators are available in TO-252 package.Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided ,It can deliver over 0.5A output current, Although designed as fixed voltage regulators, It can be used with external components to obtain adjustable voltage and currents.

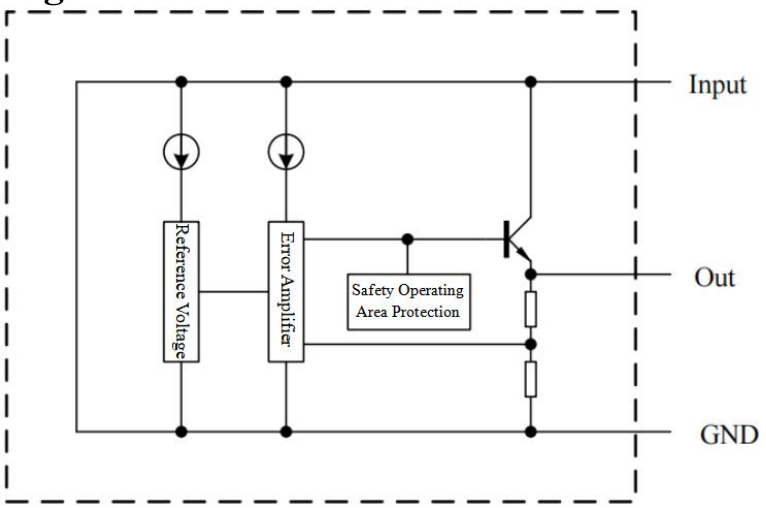
Pin Configuration(TO-252)		
Pin NO.	Pin Name	Function
1	VIN	Input voltage pin
2	GND	GND pin
3	VOUT	Output voltage pin

TO-252

Features

- Output current up to 0.5A
- Thermal overload protection
- Short circuit protection
- Output Transistor SOA protection

Internal Block Diagram



Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
DC Input Voltage	6~15V	V_{IN}	35	V
	18~24V		40	
Output Current		I_{OUT}	0.5	A
Power Dissipation		P_D	Internally Limited	W
Operating Junction Temperature Range		T_J	150	℃
Storage Temperature Range		T_{STG}	-40~+150	℃

Recommend Operating Conditions

Parameter		Symbol	Value	Unit
DC Input Voltage	6~15V	V_{IN}	30	V
	18~24V		35	
Output Current		I_{OUT}	0.5	A
Operating Ambient Temperature		T_A	-40~+125	℃

78M06 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=11V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		5.75	6	6.25	V
Output Voltage	V_{OUT}	V_{IN}=8 to 21V,I_{OUT}=5 to 350mA	5.7	6	6.3	V
Line Regulation	ΔV_{OUT}	V_{IN}=8 to 25V,I_{OUT}=200mA			120	mV
		V_{IN}=9 to 25V,I_{OUT}=200mA			60	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			120	mV
		I_{OUT}=5 to 200mA,T_J=25℃			60	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=9 to 25V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA.T_J=0 to 125℃		0.6		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=9 to 19V, f=120Hz,I_{OUT}=300mA	59			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		45		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		200		mA

78M08 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=14V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		7.7	8.0	8.3	V
Output Voltage	V_{OUT}	V_{IN}=10 to 23V,I_{OUT}=5 to 350mA	7.6	8.0	8.4	V
Line Regulation	ΔV_{OUT}	V_{IN}=10.5 to 25V,I_{OUT}=200mA			160	mV
		V_{IN}=11 to 25V,I_{OUT}=200mA			80	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			160	mV
		I_{OUT}=5 to 200mA,T_J=25℃			80	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=10.5 to 25V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA.T_J=0 to 125℃		0.7		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=11.5 to 21.5V, f=120Hz,I_{OUT}=300mA	56			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		52		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		200		mA

78M09 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=15V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		8.65	9	9.35	V
Output Voltage	V_{OUT}	V_{IN}=11 to 24V,I_{OUT}=5 to 350mA	8.55	9	9.45	V
Line Regulation	ΔV_{OUT}	V_{IN}=11.5 to 25V,I_{OUT}=200mA			180	mV
		V_{IN}=12 to 25V,I_{OUT}=200mA			90	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			180	mV
		I_{OUT}=5 to 200mA,T_J=25℃			90	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=11.5 to 25V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA.T_J=0 to 125℃		0.9		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=12.5 to 23V, f=120Hz,I_{OUT}=300mA	56			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		58		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		200		mA

78M10 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=17V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		9.6	10	10.4	V
Output Voltage	V_{OUT}	V_{IN}=12.5 to 25V,I_{OUT}=5 to 350mA	9.5	10	10.5	V
Line Regulation	ΔV_{OUT}	V_{IN}=12.5 to 28V,I_{OUT}=200mA			210	mV
		V_{IN}=14 to 20V,I_{OUT}=200mA			120	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			210	mV
		I_{OUT}=5 to 200mA,T_J=25℃			120	
Quiescent Current	I_Q				6	mA
Quiescent Current Charge	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=12.5 to 28V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA.T_J=0 to 125℃		1		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=12.5 to 28V, f=120Hz,I_{OUT}=300mA	55			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		75		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		200		mA

78M15 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=19V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		14.4	15	15.6	V
Output Voltage	V_{OUT}	V_{IN}=17 to 30V,I_{OUT}=5 to 350mA	14.25	15	15.75	V
Line Regulation	ΔV_{OUT}	V_{IN}=17.5 to 30V,I_{OUT}=200mA			300	mV
		V_{IN}=20 to 30V,I_{OUT}=200mA			150	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			300	mV
		I_{OUT}=5 to 200mA,T_J=25℃			150	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=17.5 to 30V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA.T_J=0 to 125℃		1.2		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=18.5 to 28.5V, f=120Hz,I_{OUT}=300mA	53			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		100		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		200		mA

78M18 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=26V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		17.3	18	18.7	V
Output Voltage	V_{OUT}	V_{IN}=20 to 33V,I_{OUT}=5 to 350mA	17.1	18	18.9	
Line Regulation	ΔV_{OUT}	V_{IN}=21 to 33V,I_{OUT}=200mA			360	mV
		V_{IN}=24 to 33V,I_{OUT}=200mA			180	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			360	mV
		I_{OUT}=5 to 200mA,T_J=25℃			180	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=21 to 33V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA,T_J=0 to 125℃		-1.1		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=22 to 32V, f=120Hz,I_{OUT}=300mA	53			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		100		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		240		mA

78M24 Electrical Characteristics

(Refer to test circuits, -40℃<T_j<125℃,I_O=350mA,V_I=33V,C_I=0.33μF,C_O=0.1μF,unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		23	24	25	V
Output Voltage	V_{OUT}	V_{IN}=27 to 38V,I_{OUT}=5 to 350mA	22.8	24	25.2	V
Line Regulation	ΔV_{OUT}	V_{IN}=27 to 38V,I_{OUT}=200mA			480	mV
		V_{IN}=28 to 38V,I_{OUT}=200mA			240	
Load Regulation	ΔV_{OUT}	I_{OUT}=5 to 500mA,T_J=25℃			480	mV
		I_{OUT}=5 to 200mA,T_J=25℃			240	
Quiescent Current	I_Q				6	mA
Quiescent Current Change	ΔI_Q	I_{OUT}=5 to 350mA			0.5	mA
		V_{IN}=27 to 38V,I_{OUT}=200mA			0.8	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_{OUT}=5mA,T_J=0 to 125℃		-1.2		mV/℃
Supply Voltage Rejection	SVR	V_{IN}=28 to 38V, f=120Hz,I_{OUT}=300mA	50			dB
Output Noise Voltage	V_N	f=10Hz to 100kHz		170		μV
Dropout Voltage	V_{OUT}			2		V
Short Circuit Current	I_{SC}	V_{IN}=35V		240		mA

Test Circuits

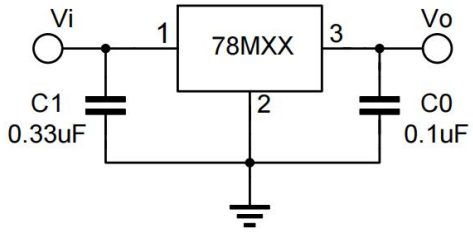


Fig.1 DC PARAMETERS

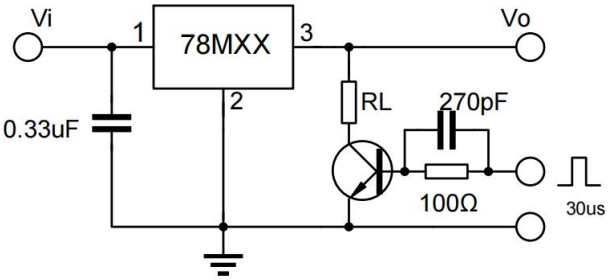


Fig.2 LOAD REGULATION

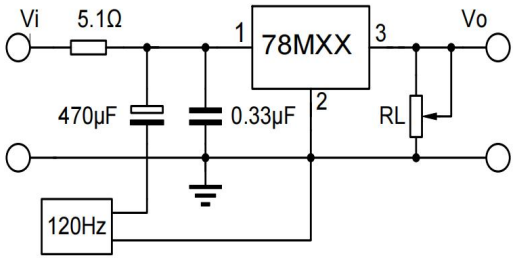
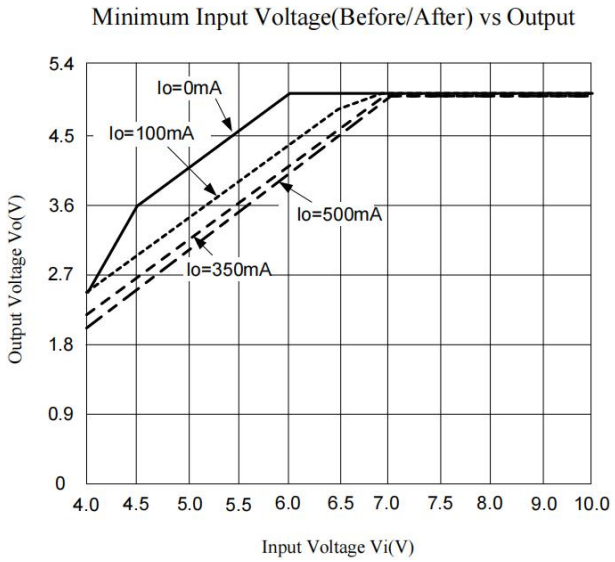
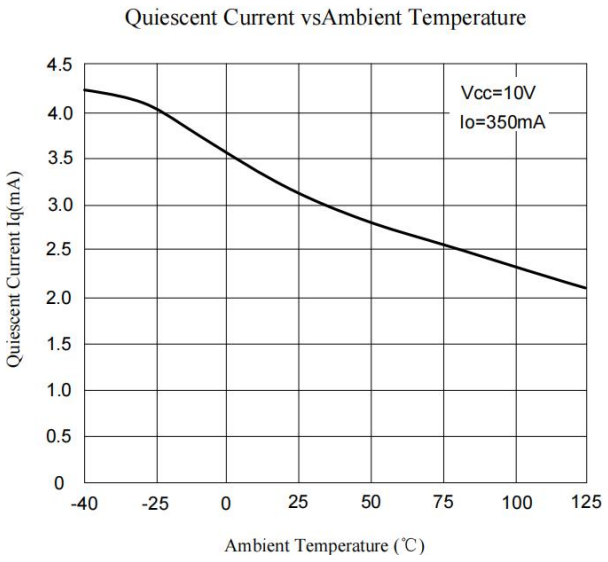


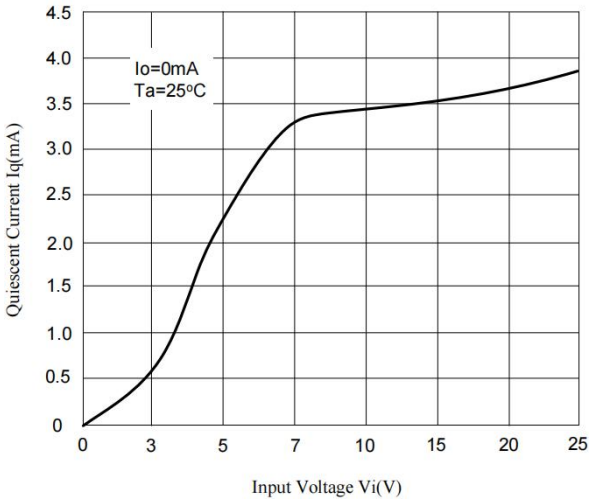
Fig.3 RIPPLE REJECTION

Typical Characteristics Curve

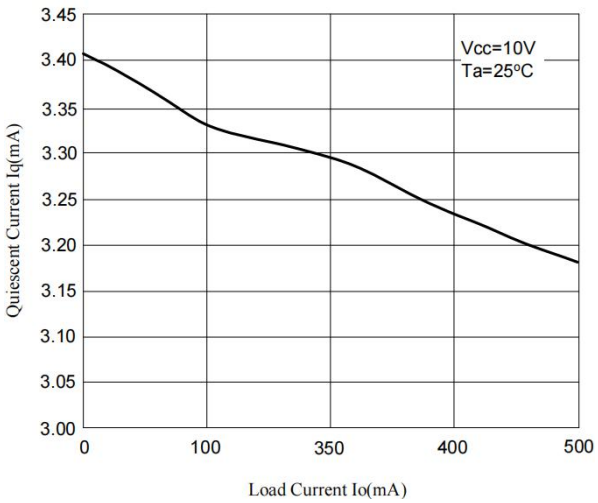




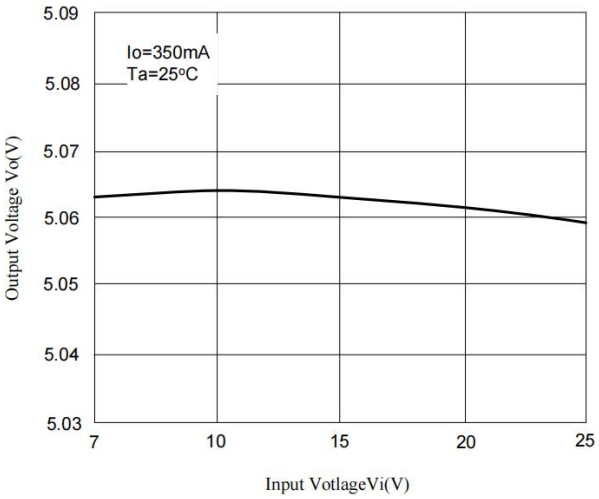
Quiescent Current vsInput Coltage



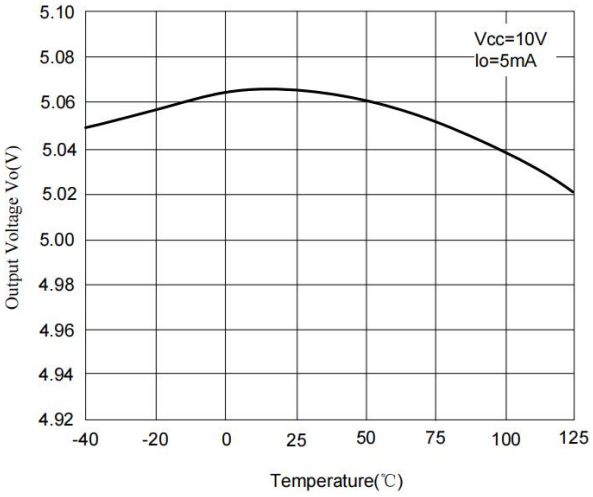
Quiescent Current vsLoad Current



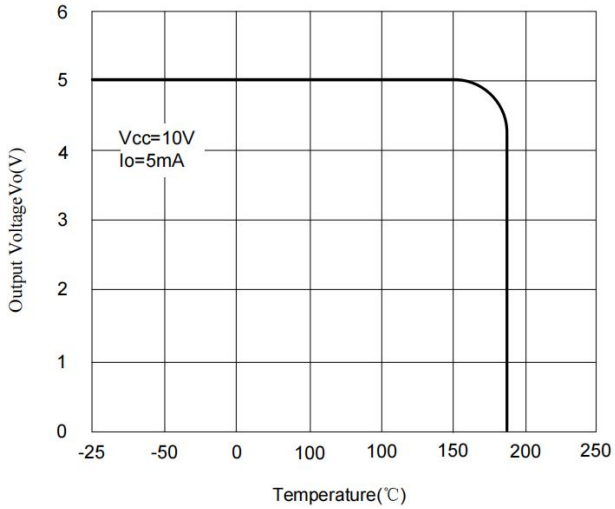
Output Voltage vsInput Voltage



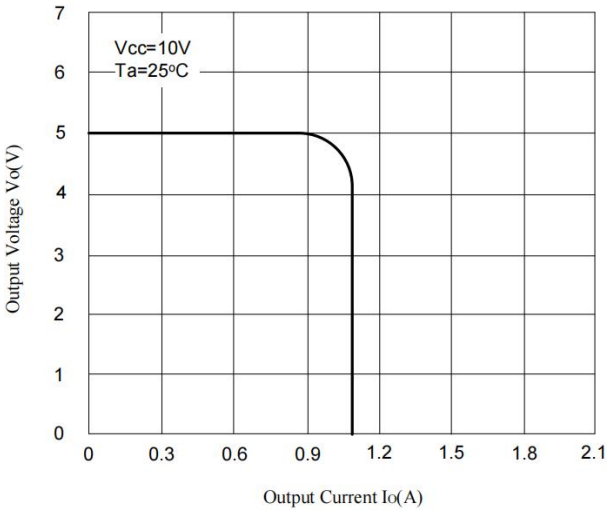
Output Voltage Temperature Drift Curve



Temperature Protection Curve



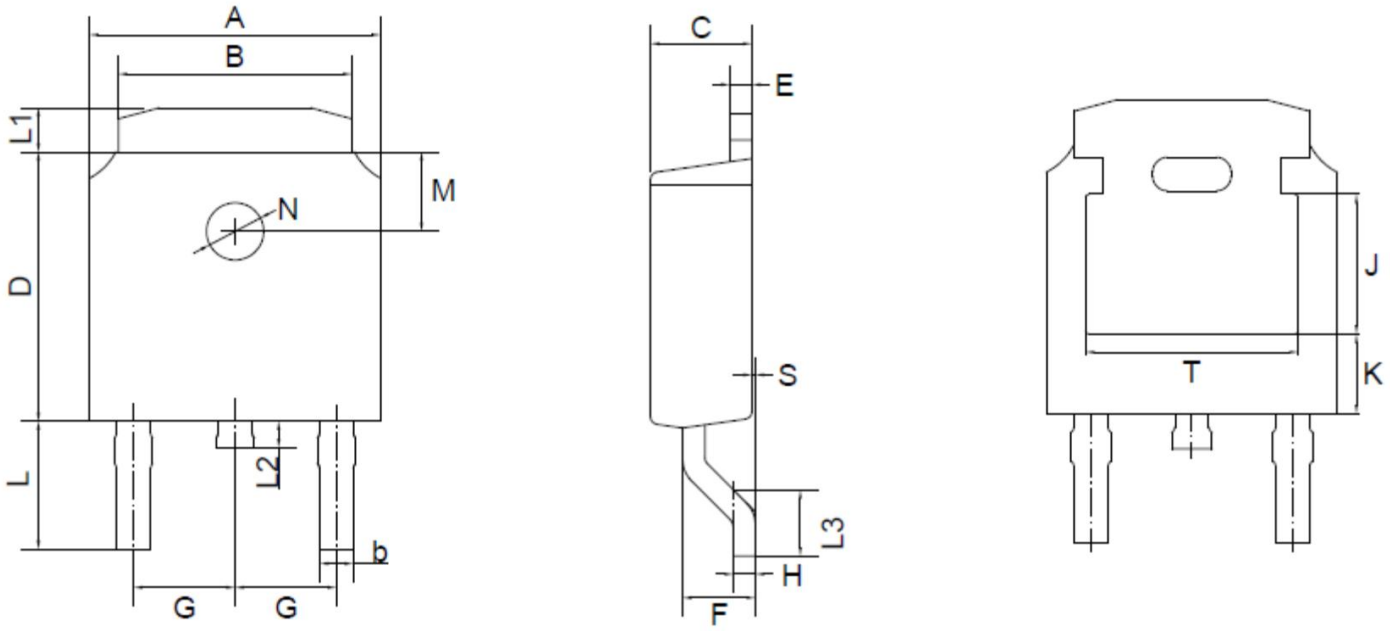
Overcurrent Protection



Package Information

TO-252

Dimensions in mm



TO-252(D-PAK) mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.1	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.40	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	4	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

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