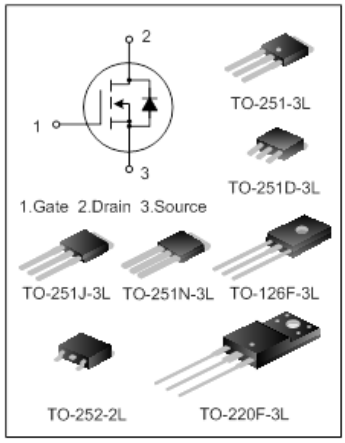
2A, 700V N-Channel MOSFET

General Description

GGVF2N70M/MJ/MNG/F/D/NF is an N-channel enhancement mode power MOS field effect transistor. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and to withstand high energy pulses in the avalanche and commutation mode.



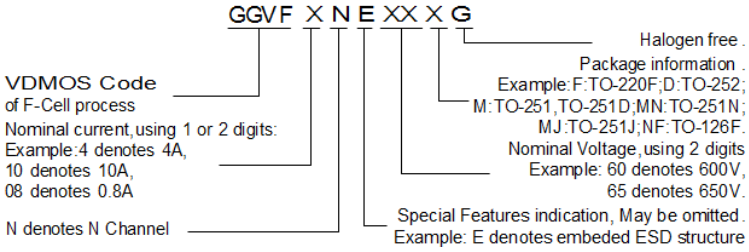
Features

- 2A,700V,$R_{DS(on)}$ (typ.) =5.0Ω@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

Applications

- AC-DC power supplies
- DC-DC converters
- H-bridge PWM motor drivers

Nomenclature



Ordering Information

Part No.	Package	Marking	Material	Packing
GGVF2N70M	TO-251-3L	GGVF2N70M	Pb free	Tube
GGVF2N70M	TO-251D-3L	GGVF2N70M	Halogen free	Tube
GGVF2N70MJ	TO-251J-3L	GGVF2N70MJ	Pb free	Tube
GGVF2N70MNG	TO-251N-3L	GGVF2N70MNG	Halogen free	Tube
GGVF2N70F	TO-220F-3L	GGVF2N70F	Pb free	Tube
GGVF2N70F	TO-220F-3L	GGVF2N70F	Halogen free	Tube
GGVF2N70D	TO-252-2L	GGVF2N70D	Halogen free	Tube
GGVF2N70DTR	TO-252-2L	GGVF2N70D	Halogen free	Tape & Reel
GGVF2N70NF	TO-126F-3L	GGVF2N70NF	Pb free	Tube

Absolute Maximum Ratings (T_c=25°C unless otherwise noted)

Characteristics		Symbol	Rating					Unit
			GGVF2N70M/D	GGVF2N70MNG	GGVF2N70MJ	GGVF2N70F	GGVF2N70NF	
Drain-Source Voltage		V_{DS}	700					V
Gate-Source Voltage		V_{GS}	±30					V
Drain Current	T_C=25°C	I_D	2.0					A
	T_C=100°C		1.3					
Drain Current Pulsed		I_{DM}	8.0					A
Power Dissipation(T_C=25°C)		P_D	39	30	40	28	18	W
-Derate above 25°C			0.31	0.24	0.32	0.22	0.14	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	118					mJ
Operation Junction Temperature Range		T_J	-55～+150					°C
Storage Temperature Range		T_{stg}	-55～+150					°C

Thermal Characteristics

Characteristics	Symbol	Rating					Unit
		GGVF2N70M/D	GGVF2N70MNG	GGVF2N70MJ	GGVF2N70F	GGVF2N70NF	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.21	4.17	3.13	4.46	6.94	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	110	110	120	120	°C/W

Electrical Characteristics (T_c=25°C unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=250μA	700	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	2.0	--	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=1.0A	--	5.0	6.5	Ω
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz	--	260.1	--	pF
Output Capacitance	C_{oss}		--	32.2	--	
Reverse Transfer Capacitance	C_{rss}		--	1.3	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=350V,I_D=2.0A, R_G=25Ω (Note 2,3)	--	8.73	--	ns
Turn-on Rise Time	t_r		--	22.27	--	
Turn-off Delay Time	$t_{d(off)}$		--	12.53	--	
Turn-off Fall Time	t_f		--	21.07	--	
Total Gate Charge	Q_g	V_{DS}=560V,I_D=2.0A, V_{GS}=10V (Note 2,3)	--	5.96	--	nC
Gate-Source Charge	Q_{gs}		--	1.77	--	
Gate-Drain Charge	Q_{gd}		--	2.08	--	

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Gate Resistance	R_g	F=1 Mhz, 1Vpp, ±2V DC offset	1.9	2.8	3.9	Ω

Source-Drain Diode Ratings And Characteristics

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	2.0	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	8.0	
Diode Forward Voltage	V_{SD}	I_S=2.0A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=2.0A,V_{GS}=0V,	--	369.35	--	ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt=100A/μS	--	1.12	--	μC

Notes:

1. L=30mH, I_{AS}=2.58A, V_{DD}=95V, R_G=25Ω,starting T_J=25°C;
2. Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;
3. Essentially independent of operating temperature.

Typical Characteristics

Figure 1. On-Region Characteristics

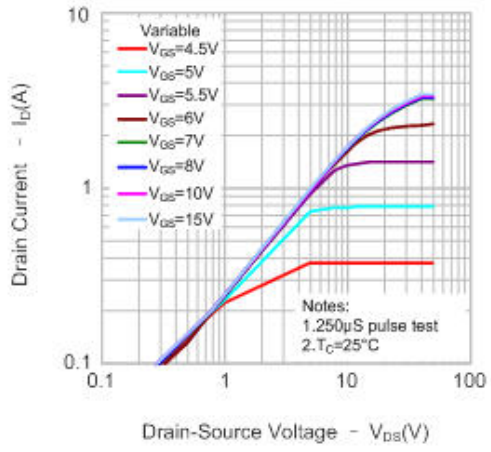


Figure 2. Transfer Characteristics

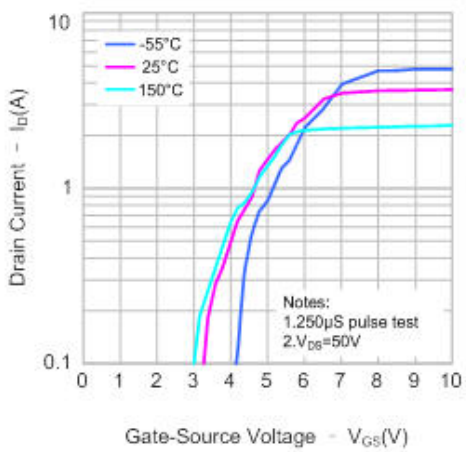


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

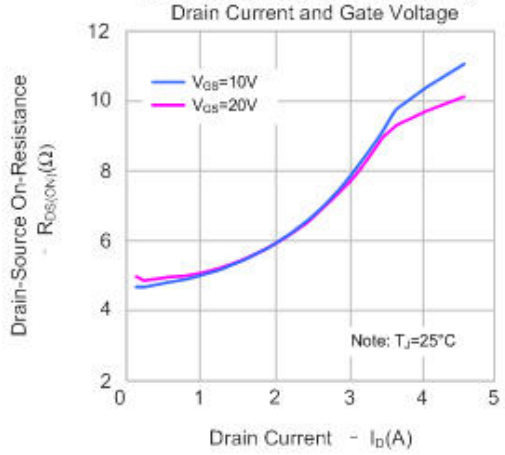


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

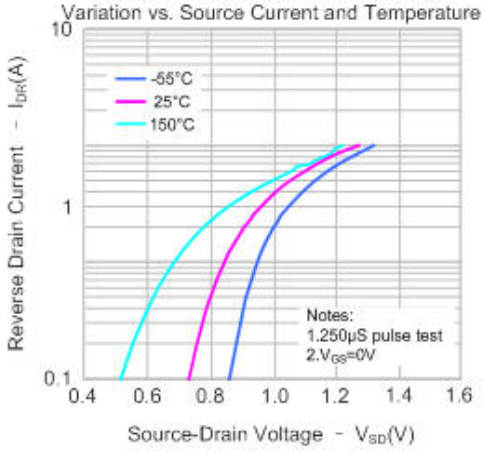


Figure 5. Capacitance Characteristics

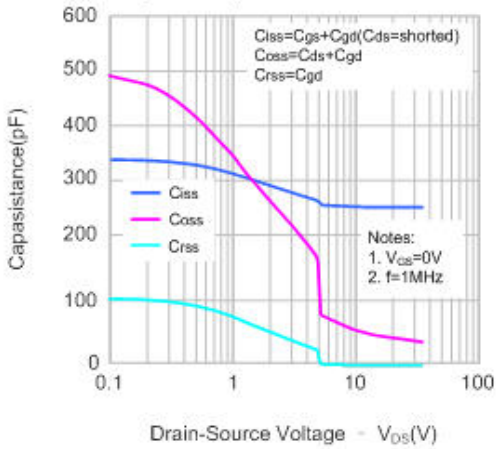
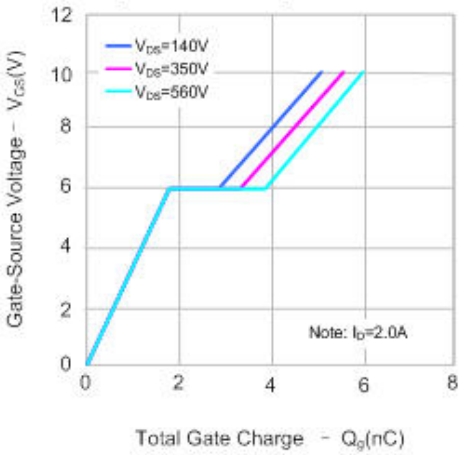


Figure 6. Gate Charge Characteristics



Typical Characteristics (continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

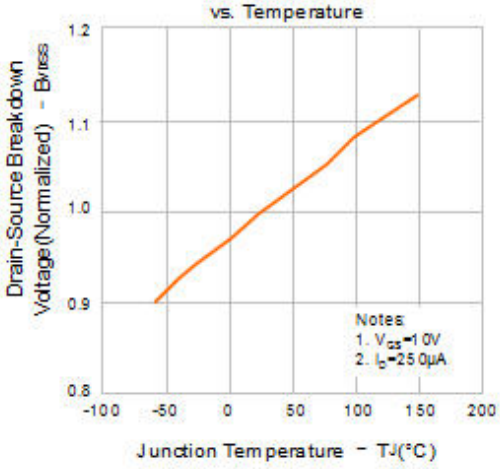


Figure 8. On-resistance Variation vs. Temperature

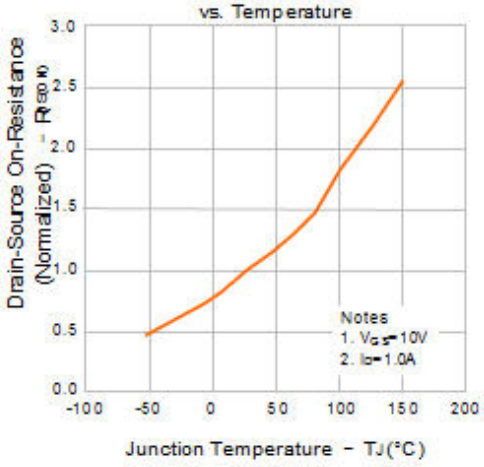


Figure 9-1. Max. Safe Operating Area (GGVF2N70M/D)

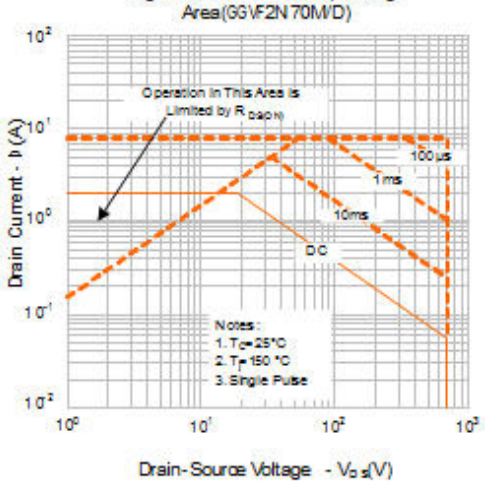


Figure 9-2. Max. Safe Operating Area (GGVF2N70MJ)

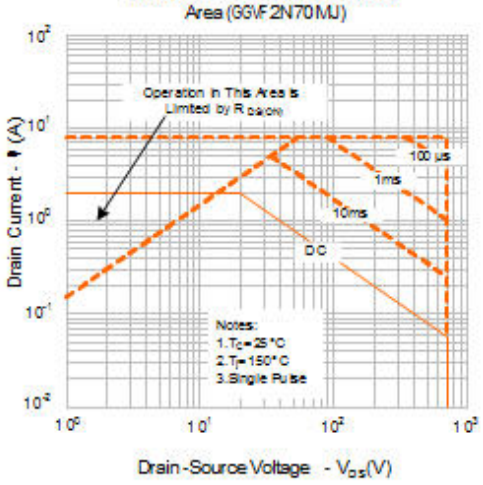


Figure 9-3. Max. Safe Operating Area (GGVF2N70MNG)

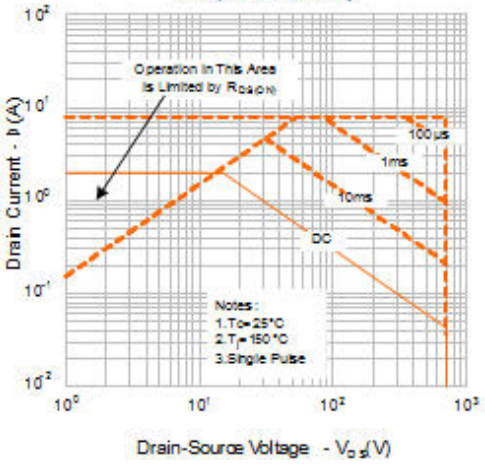
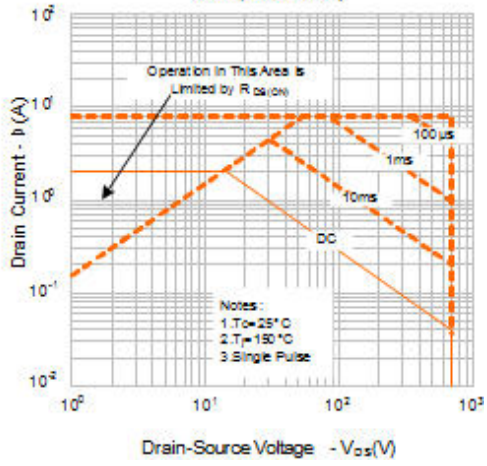


Figure 9-4. Max. Safe Operating Area (GGVF2N70F)



Typical Characteristics (continued)

Figure 9-5. Max. Safe Operating Area (GGVF2N70NF)

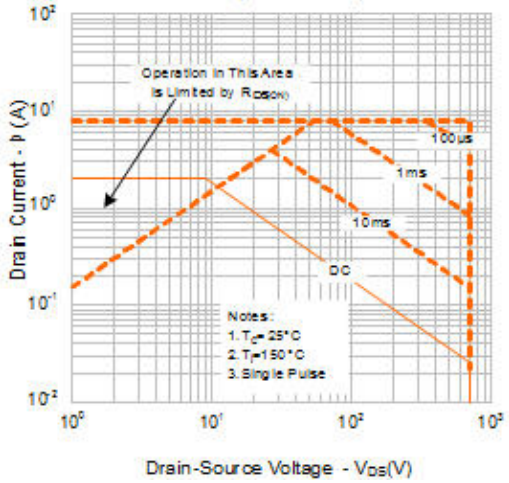
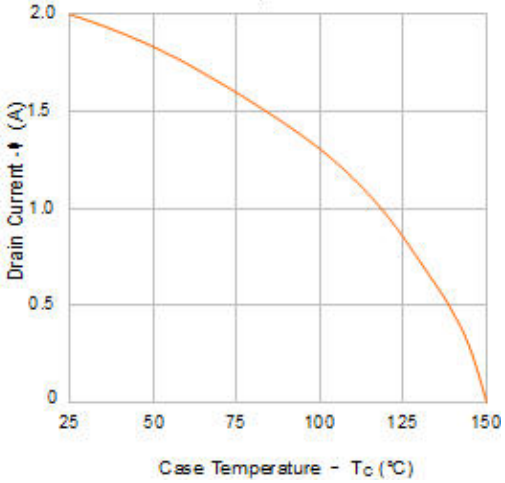
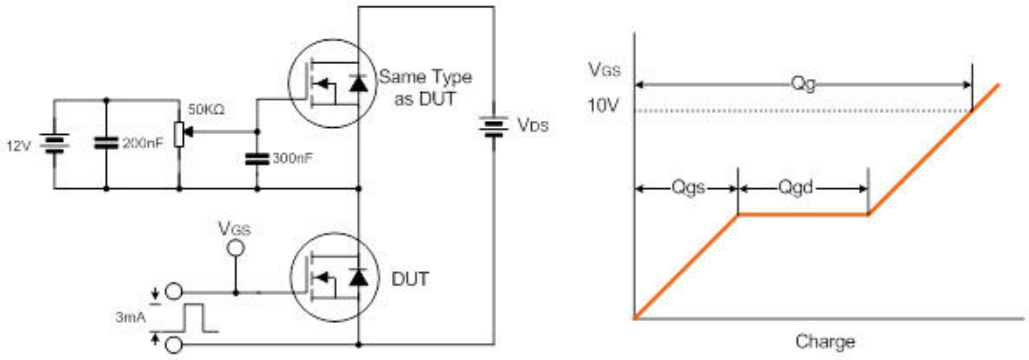


Figure 10. Max. Drain Current vs . Case Temperature

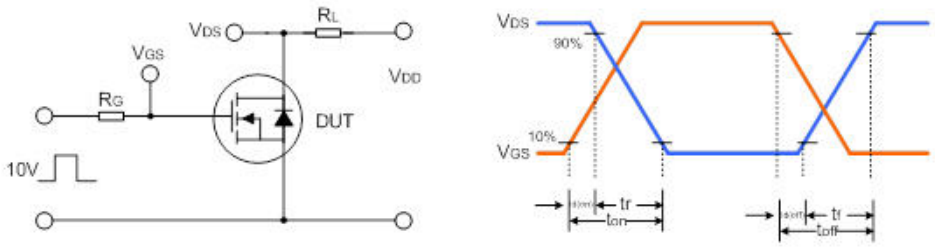


Typical Test Circuit

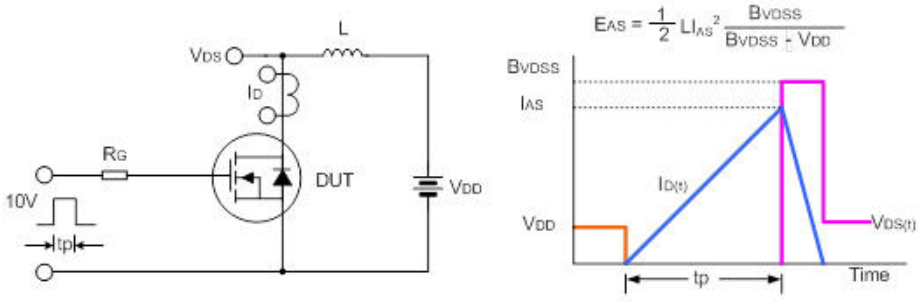
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

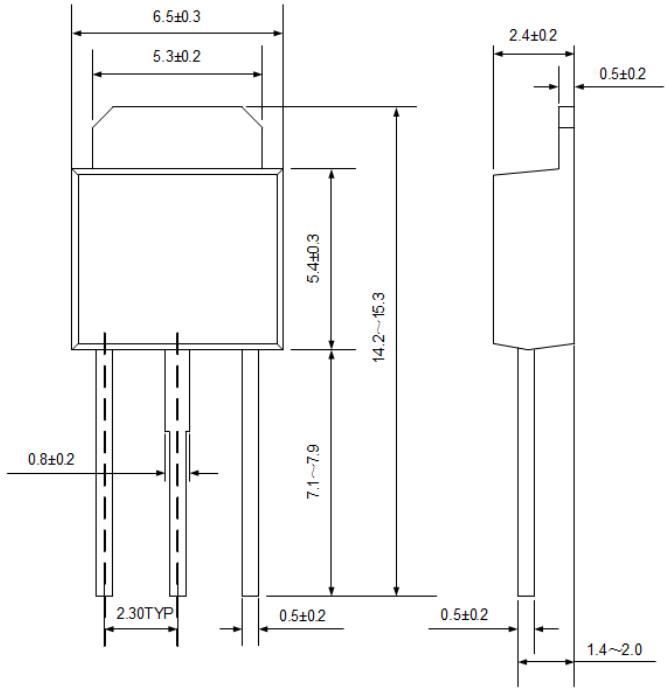


Unclamped Inductive Switching Test Circuit & Waveform

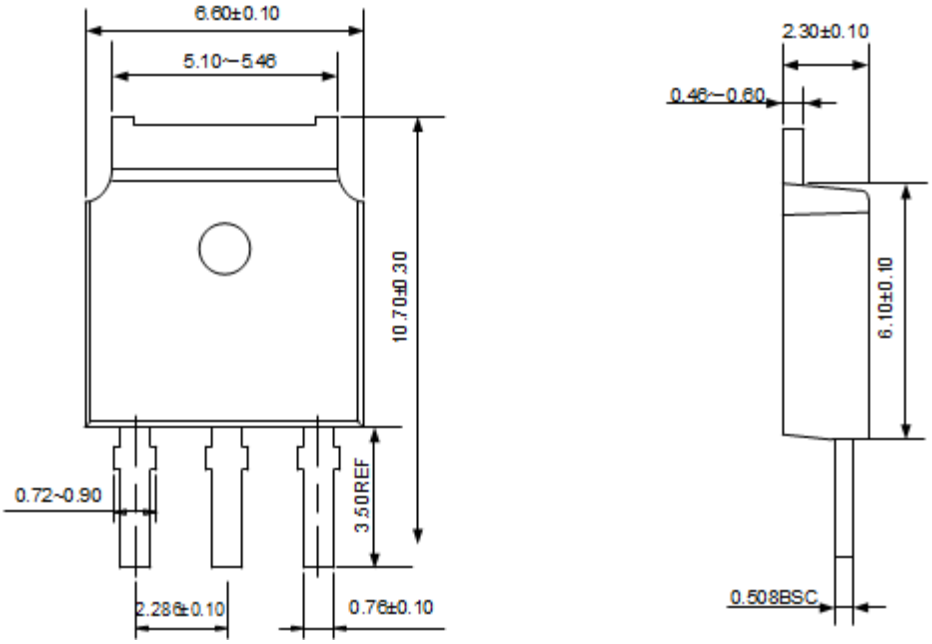


Package Outline

TO-251-3L UNIT: mm

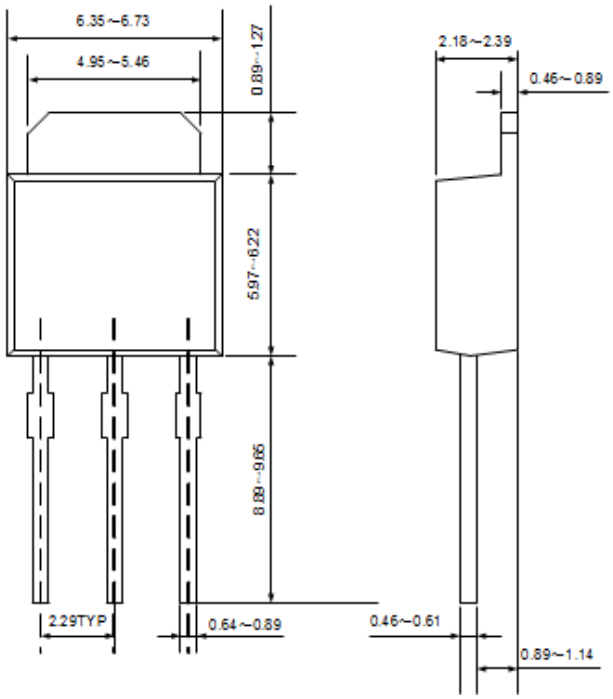


TO-251D-3L UNIT: mm

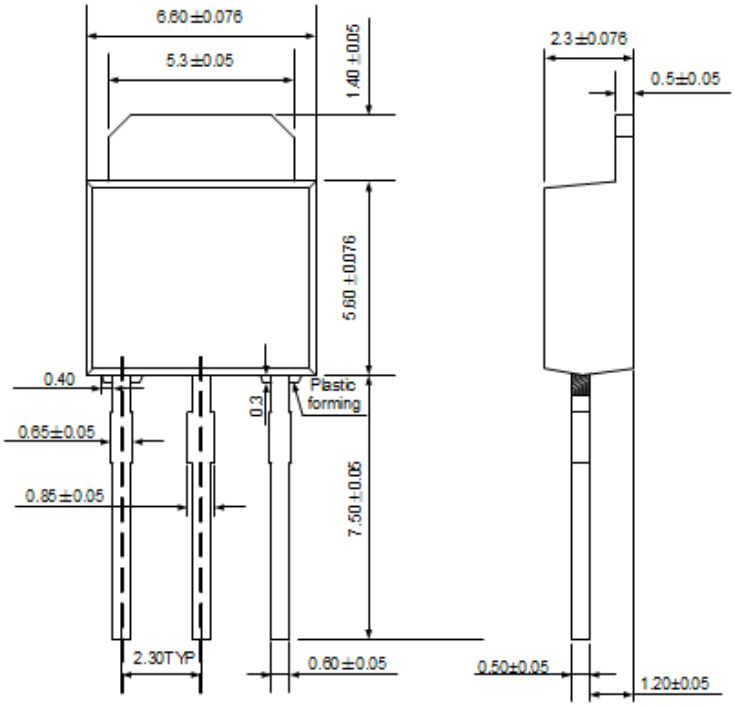


Package Outline (continued)

TO-251J-3L UNIT: mm

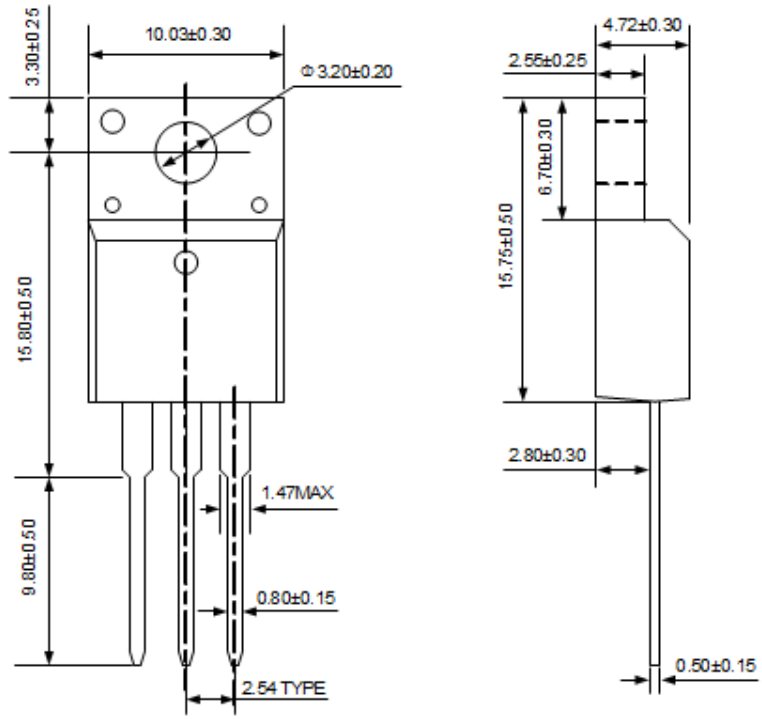


TO-251N-3L UNIT: mm

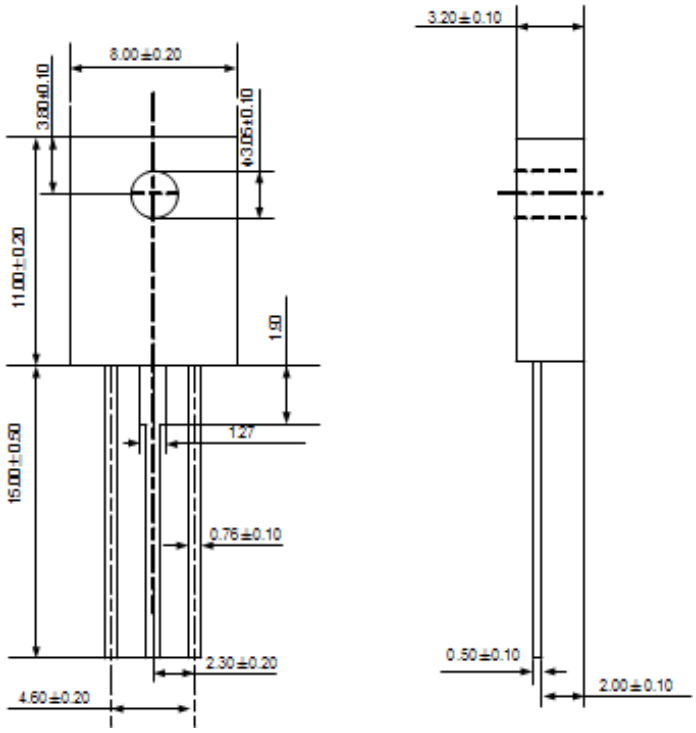


Package Outline (continued)

TO-220F-3L UNIT: mm

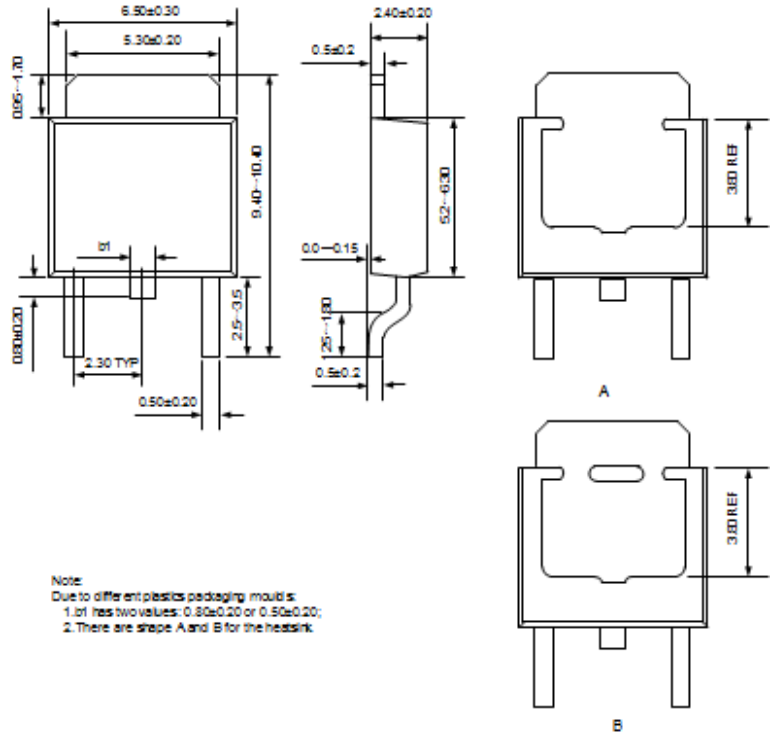


TO-126F-3L UNIT: mm



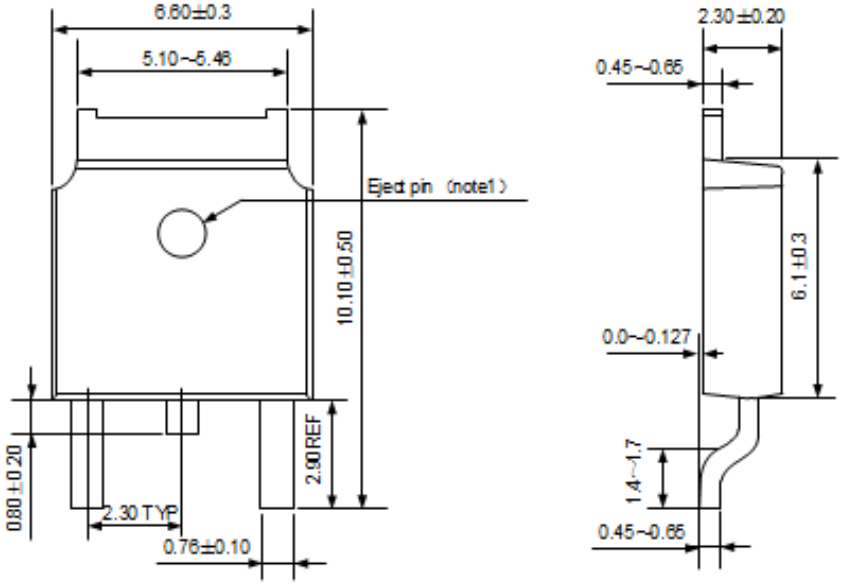
Package Outline (continued)

TO-252-2L(1) **UNIT: mm**



Note:
Due to different plastics packaging moulds:
1.b1 has two values: 0.80±0.20 or 0.50±0.20;
2.There are shape A and B for the heatsink.

TO-252-2L(2) **UNIT: mm**



NOTE1 : There are two conditions for this position:has an eject pin or has no eject pin.

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