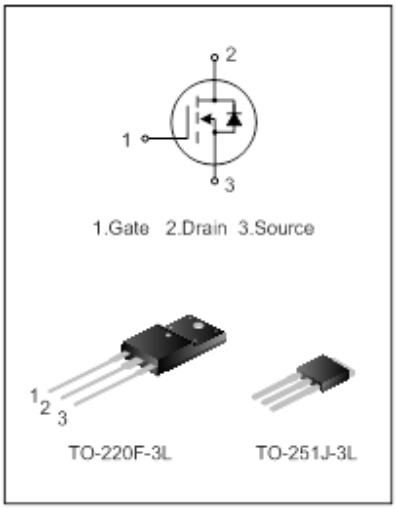
6A, 700V, N-Channel MOSFET

General Description

The GGVF6N70F/MJ 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 withstand high energy pulses in the avalanche and commutation mode.



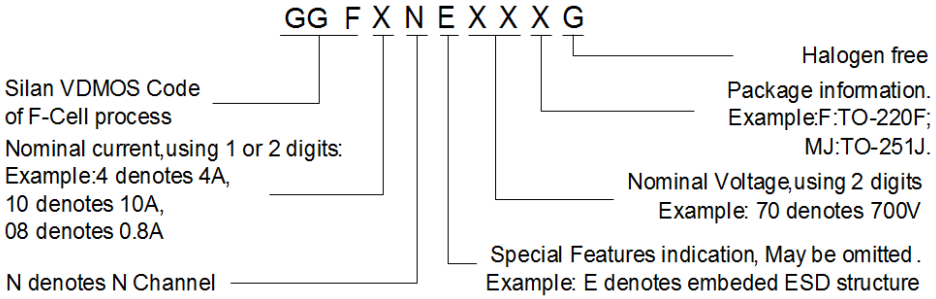
Features

- 6A, 700V
- $R_{DS(on(typ))}$=1.35Ω@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 Type	Marking	Material	Packing
GGVF6N70F	TO-220F-3L	GGVF6N70F	Pb free	Tube
GGVF6N70MJ	TO-251J-3L	GGVF6N70MJ	Pb free	Tube
GGVF6N70MJG	TO-251J-3L	GGVF6N70MJG	Halogen free	Tube

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

Characteristics		Symbol	Ratings		Unit
			GGVF6N70F	GGVF6N70MJ(G)	
Drain-Source Voltage		V_{DS}	700		V
Gate-Source Voltage		V_{GS}	±30		V
Drain Current	T_C=25°C	I_D	6.0		A
	T_C=100°C		3.79		
Drain Current Pulsed		I_{DM}	24.0		A
Power Dissipation(T_C=25°C)		P_D	45	128	W
-Derate above 25°C			0.36	1.02	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	463		mJ
Operation Junction Temperature Range		T_J	-55～+150		°C
Storage Temperature Range		T_{stg}	-55～+150		°C

Thermal Characteristics

Characteristics	Symbol	Ratings		Unit
		GGVF6N70F	GGVF6N70MJ(G)	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.78	0.98	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	120	110	°C/W

Electrical Characteristics (T_c=25°C, Unless Otherwise Specified)

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=3.0A	--	1.35	1.7	Ω
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHZ	--	898.6	--	pF
Output Capacitance	C_{oss}		--	94.7	--	
Reverse Transfer Capacitance	C_{rss}		--	2.93	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=350V,I_D=6.0A, R_G=25Ω (Note 2,3)	--	24.73	--	ns
Turn-on Rise Time	t_r		--	37.87	--	
Turn-off Delay Time	$t_{d(off)}$		--	49.33	--	
Turn-off Fall Time	t_f		--	29.67	--	
Total Gate Charge	Q_g	V_{DS}=560V,I_D=6.0A, V_{GS}=10V (Note 2,3)	--	16.53	--	nC
Gate-Source Charge	Q_{gs}		--	4.82	--	
Gate-Drain Charge	Q_{gd}		--	5.70	--	

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Source-Drain Diode Ratings and Characteristics

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	6.0	A
Pulsed Source Current	I_{SM}		--	--	24.0	
Diode Forward Voltage	V_{SD}	I_S=6.0A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=6.0A,V_{GS}=0V, dI_F/dt=100A/μs(Note 2)	--	531.25	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.3	--	μC

Notes:

1. L=30mH, I_{AS}=5.00A,V_{DD}=140V, R_G=25Ω, starting T_J=25°C;
2. Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;
3. Essentially independent of operating temperature.

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Typical Characteristics

Figure 1. On-Region Characteristics

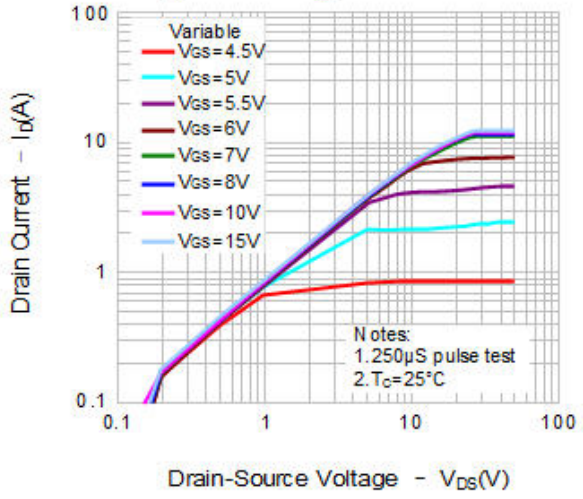


Figure 2. Transfer Characteristics

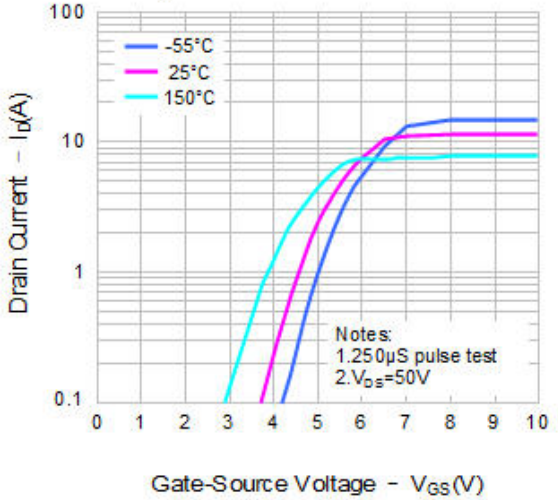


Figure 3. On-Resitance Variation vs. Drain Current

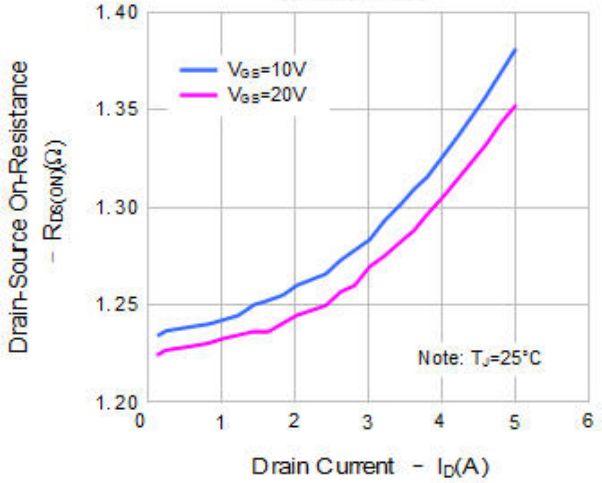


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

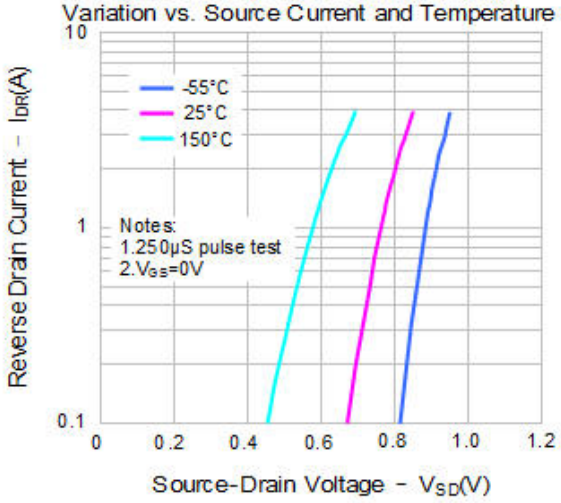


Figure 5. Capacitance Characteristics

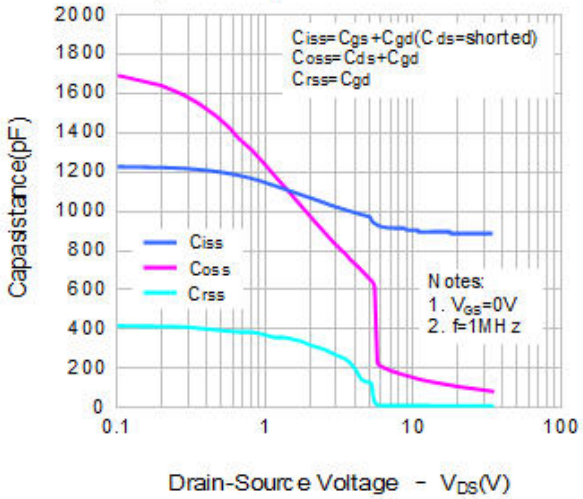
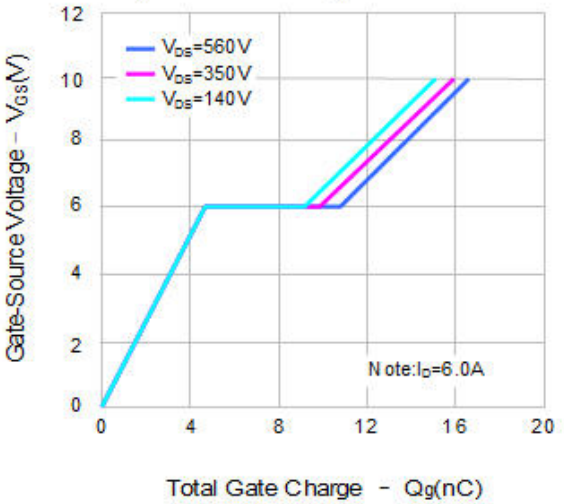


Figure 6. Gate Charge Characteristics



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Typical Characteristics (cont.)

Figure 7. Breakdown Voltage Variation vs. Temperature

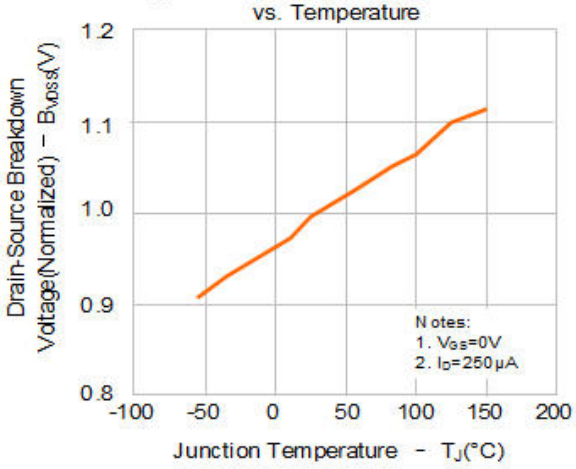


Figure 8. On-resistance Variation vs. Temperature

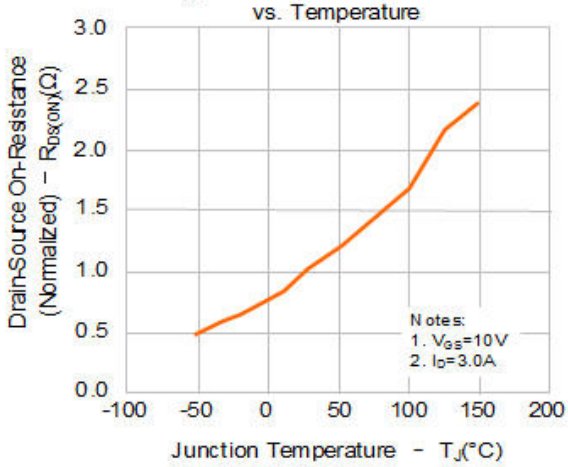


Figure 9-1. Max. Safe Operating Area (GGVF6N70F)

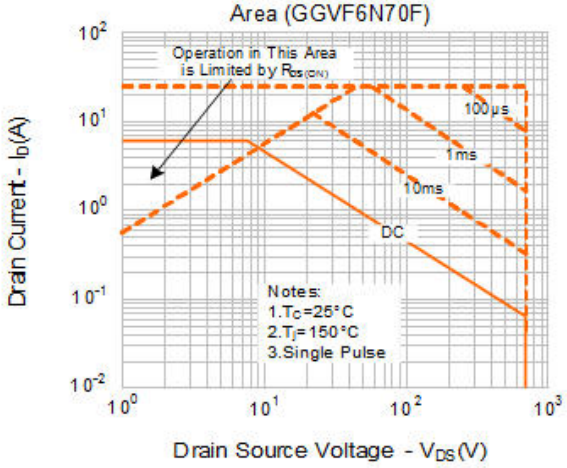


Figure 9-2. Max. Safe Operating Area (GGVF6N70MJ(G))

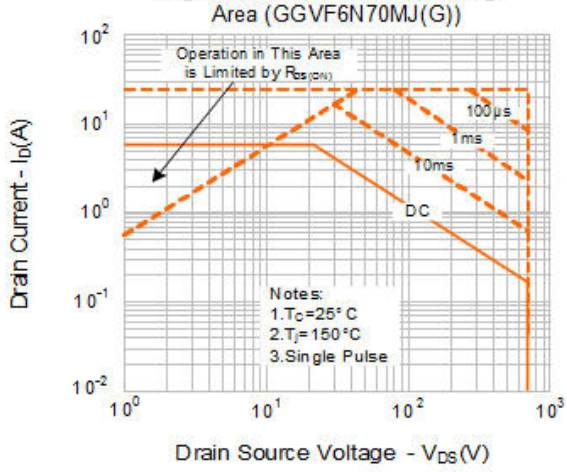
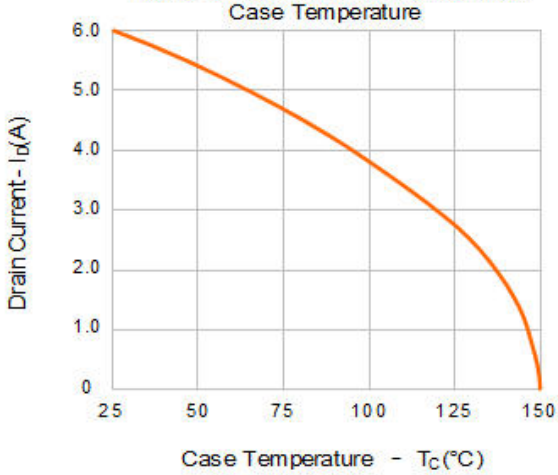


Figure 10. Maximum Drain Current vs. Case Temperature



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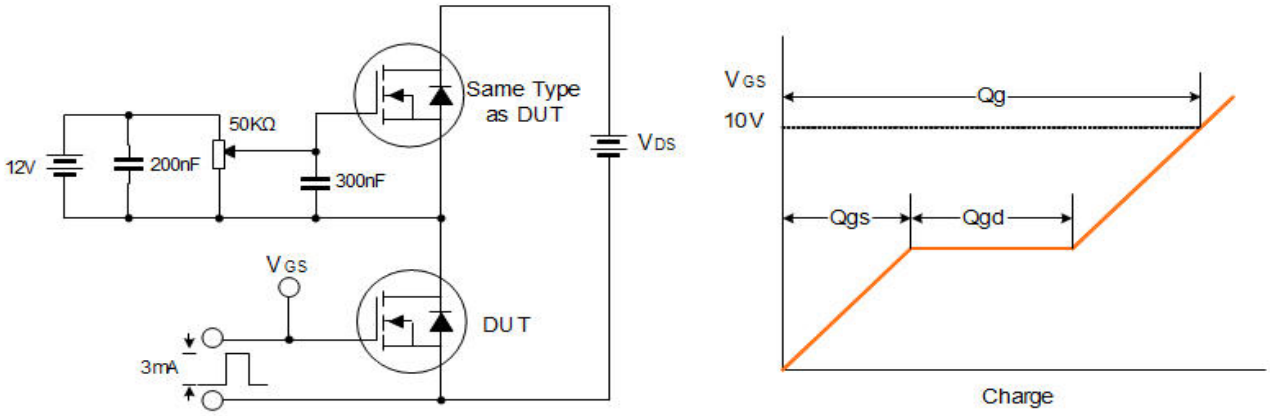
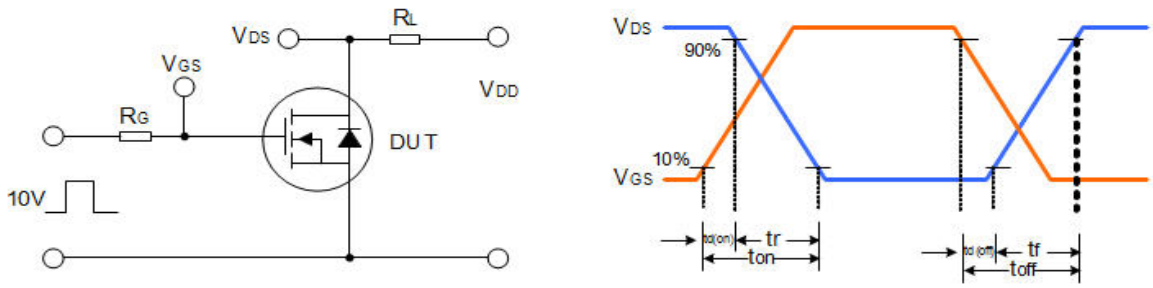
Typical Test Circuits

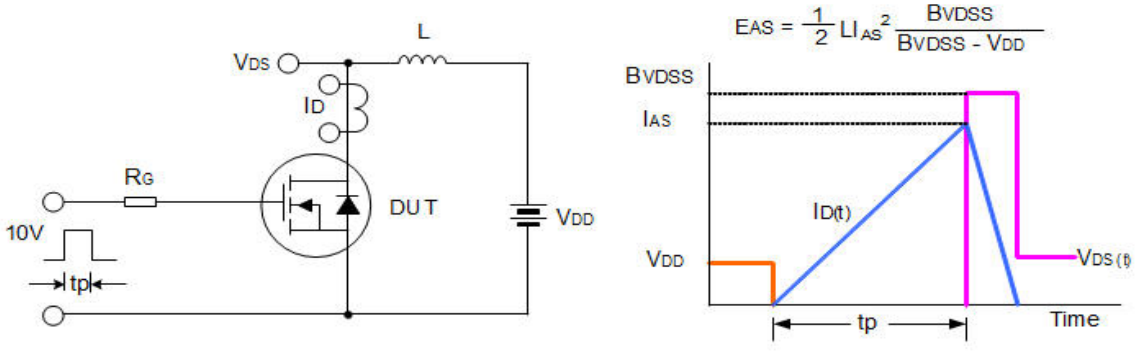
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



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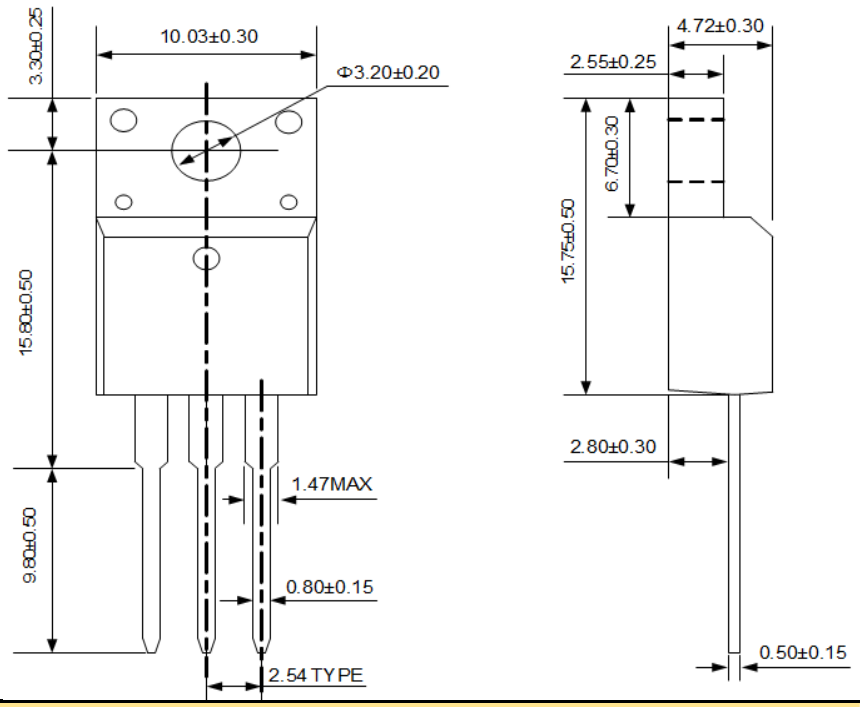
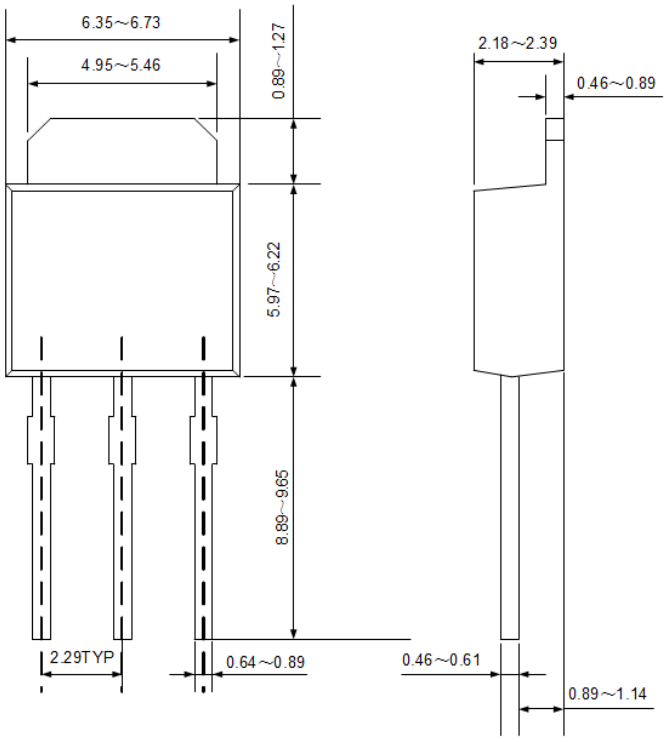
Package Outline

TO-220F-3L **UNIT: mm**



TO-251J-3L **UNIT: mm**



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