

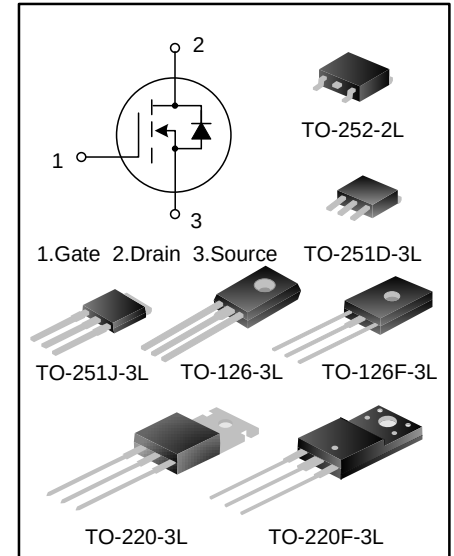
2A, 600V, N-Channel MOSFET

General Description

The GGVF2N60M/MJ/N/NF/F/FG/T/D 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

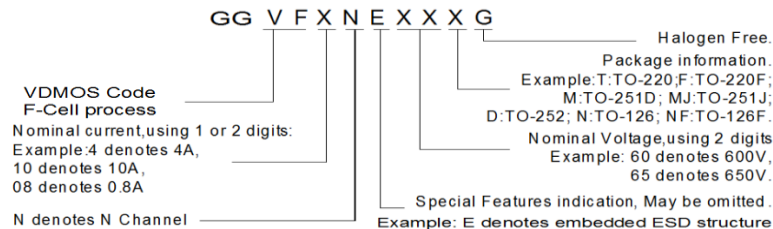
- 2A,600V
- $R_{DS(on)}(typ.)=3.7\Omega@V_{GS}=10V$
- Low gate charge
- Low C_{rss}
- Fast switching
- Improved dv/dt capability



Applications

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

Nomenclature

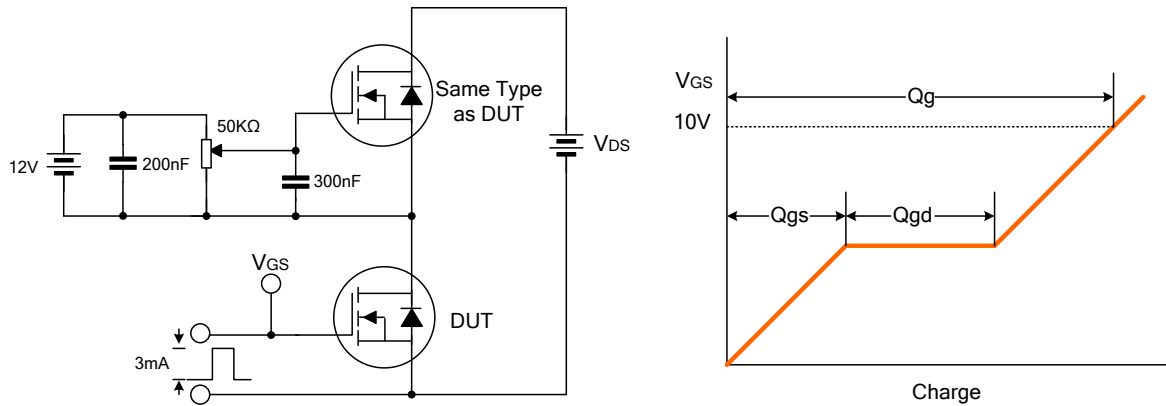


Ordering Information

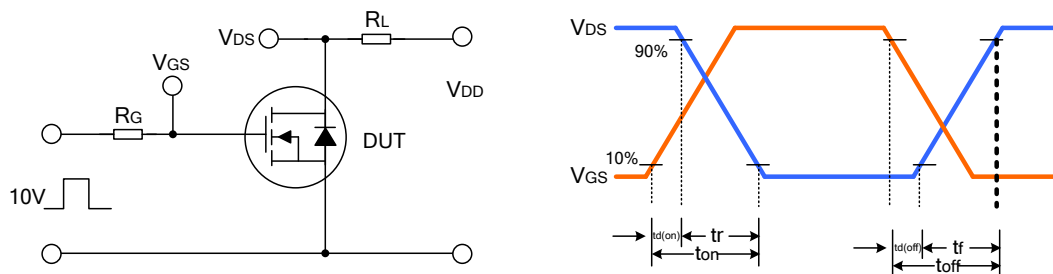
Part No.	Package Type	Marking	Material	Packing
GGVF2N60M	TO-251D-3L	GGVF2N60M	Pb free	Tube
GGVF2N60MJ	TO-251J-3L	GGVF2N60MJ	Pb free	Tube
GGVF2N60N	TO-126-3L	GGVF2N60N	Pb free	Bulk
GGVF2N60NF	TO-126F-3L	GGVF2N60NF	Pb free	Tube
GGVF2N60F	TO-220F-3L	GGVF2N60F	Pb free	Tube
GGVF2N60FG	TO-220F-3L	GGVF2N60FG	Halogen free	Tube
GGVF2N60T	TO-220-3L	GGVF2N60T	Pb free	Tube
GGVF2N60D	TO-252-2L	GGVF2N60D	Pb free	Tube
GGVF2N60DTR	TO-252-2L	GGVF2N60D	Pb free	Tape & Reel

Typical Test Circuits

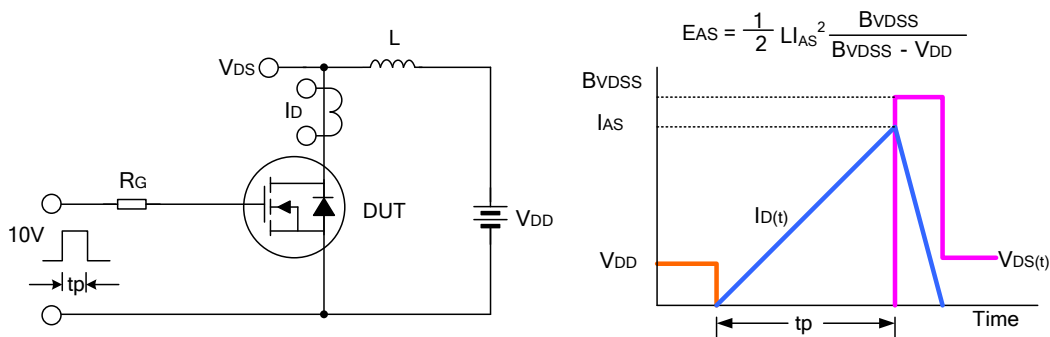
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Typical Characteristics

Figure 1. On-Region Characteristics

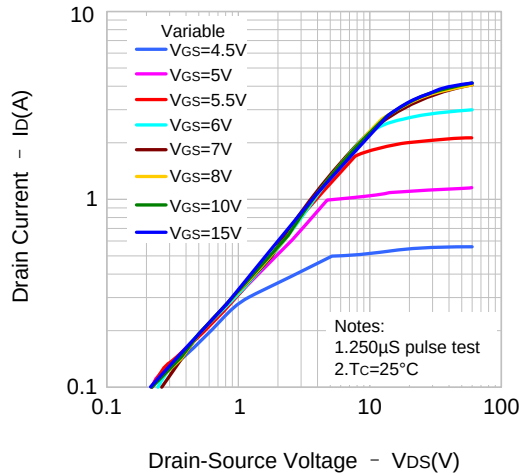


Figure 2. Transfer Characteristics

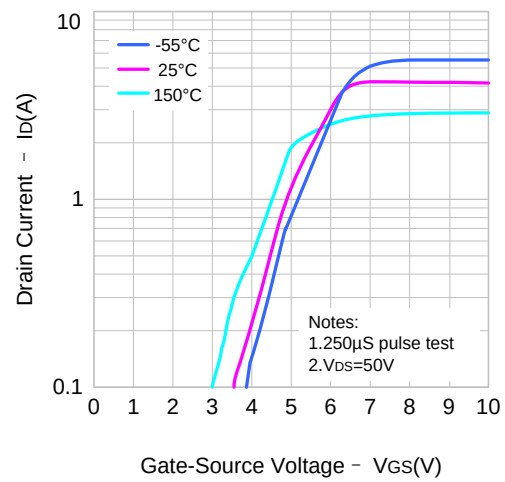


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

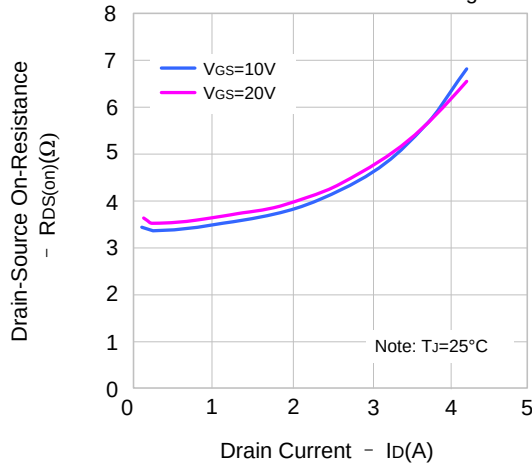
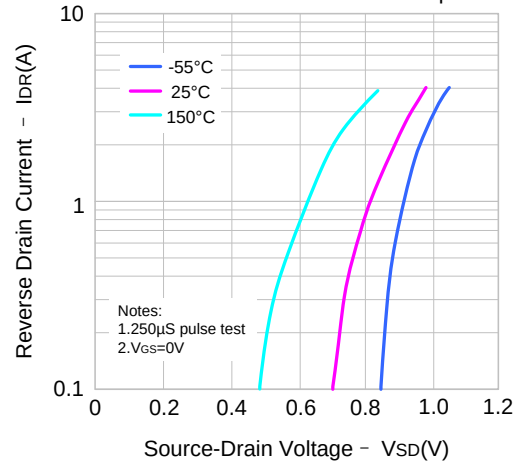
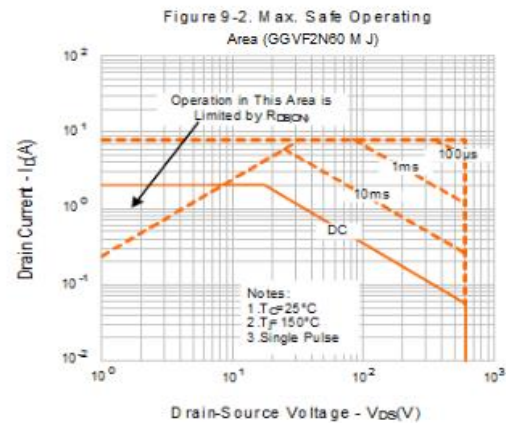
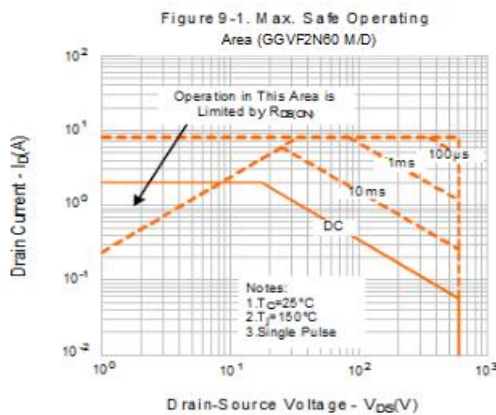
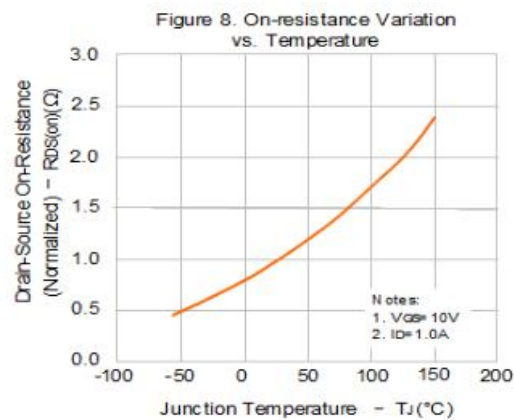
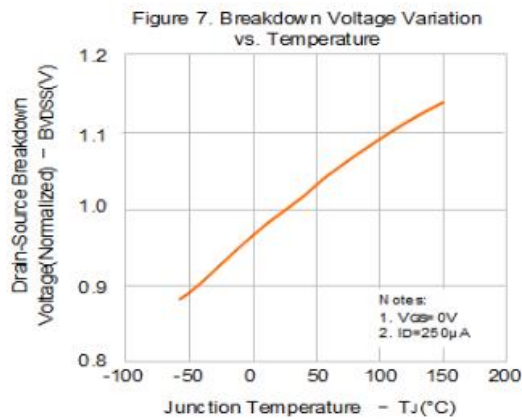
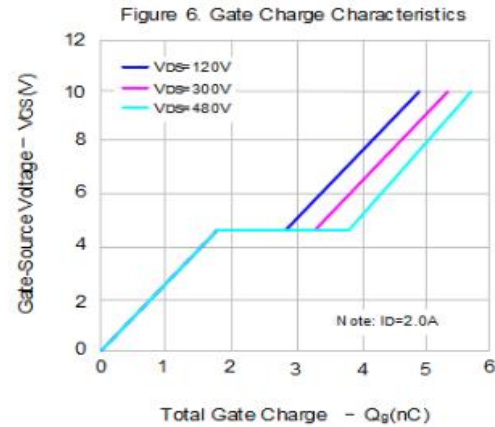
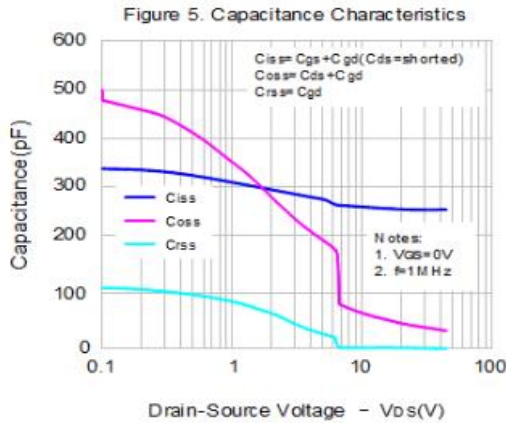


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



Typical Characteristics (continued)



Typical Characteristics (continued)

Figure 9-3. Max. Safe Operating Area (GGVF2N60T)

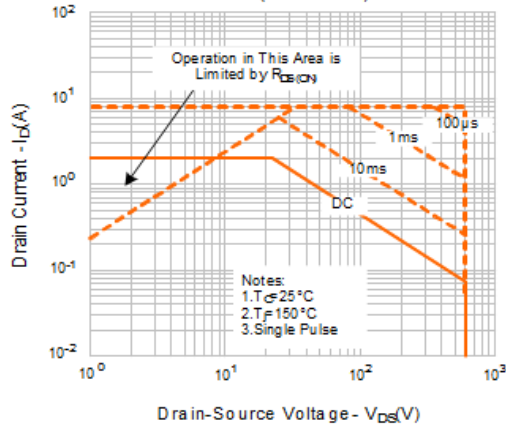


Figure 9-4. Max. Safe Operating Area (GGVF2N60F (FG))

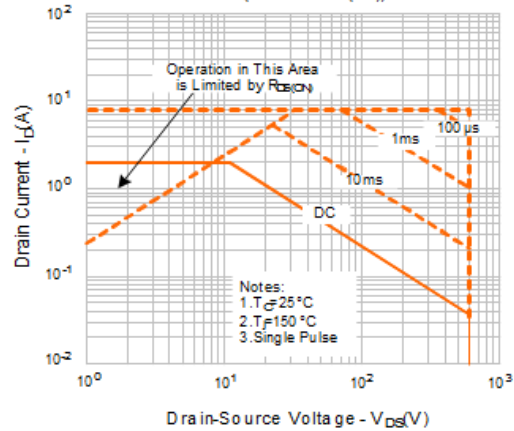


Figure 9-5. Max. Safe Operating Area (GGVF2N60N)

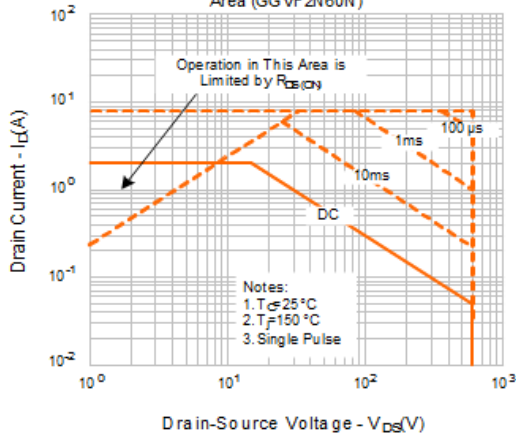


Figure 9-6. Max. Safe Operating Area (GGVF2N60NF)

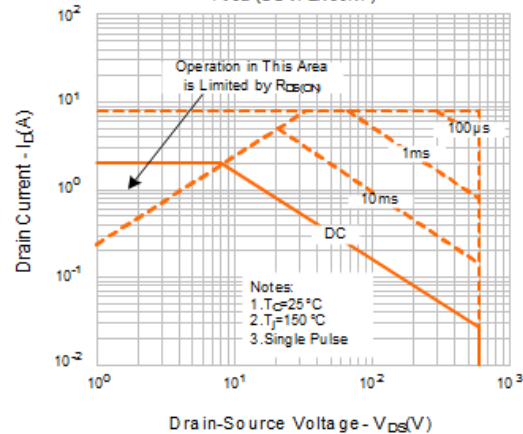
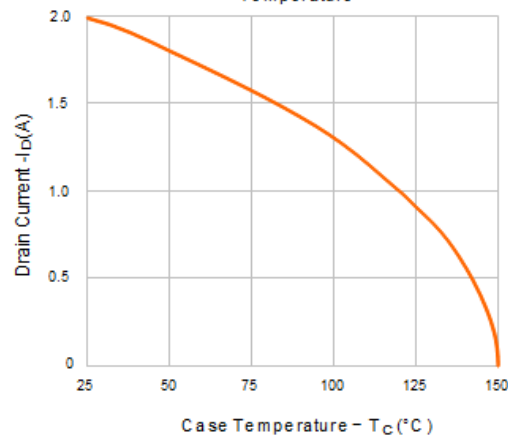


Figure 10. Max. Drain Current vs. Case Temperature



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

Characteristics		Symbol	Ratings						Unit
			GGVF2 N60M/D	GGVF2 N60MJ	GGVF2 N60N	GGVF2 N60NF	GGVF 2N60T	GGVF2N 60F(G)	
Drain-Source Voltage		V _{DS}	600						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						A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	34	35	30	16	44	23	W
			0.27	0.28	0.24	0.13	0.35	0.18	W/°C
Single Pulsed Avalanche Energy(Note 1)		E _{AS}	115						mJ
Operation Junction Temperature Range		T _J	-55~+150						°C
Storage Temperature Range		T _{stg}	-55~+150						°C

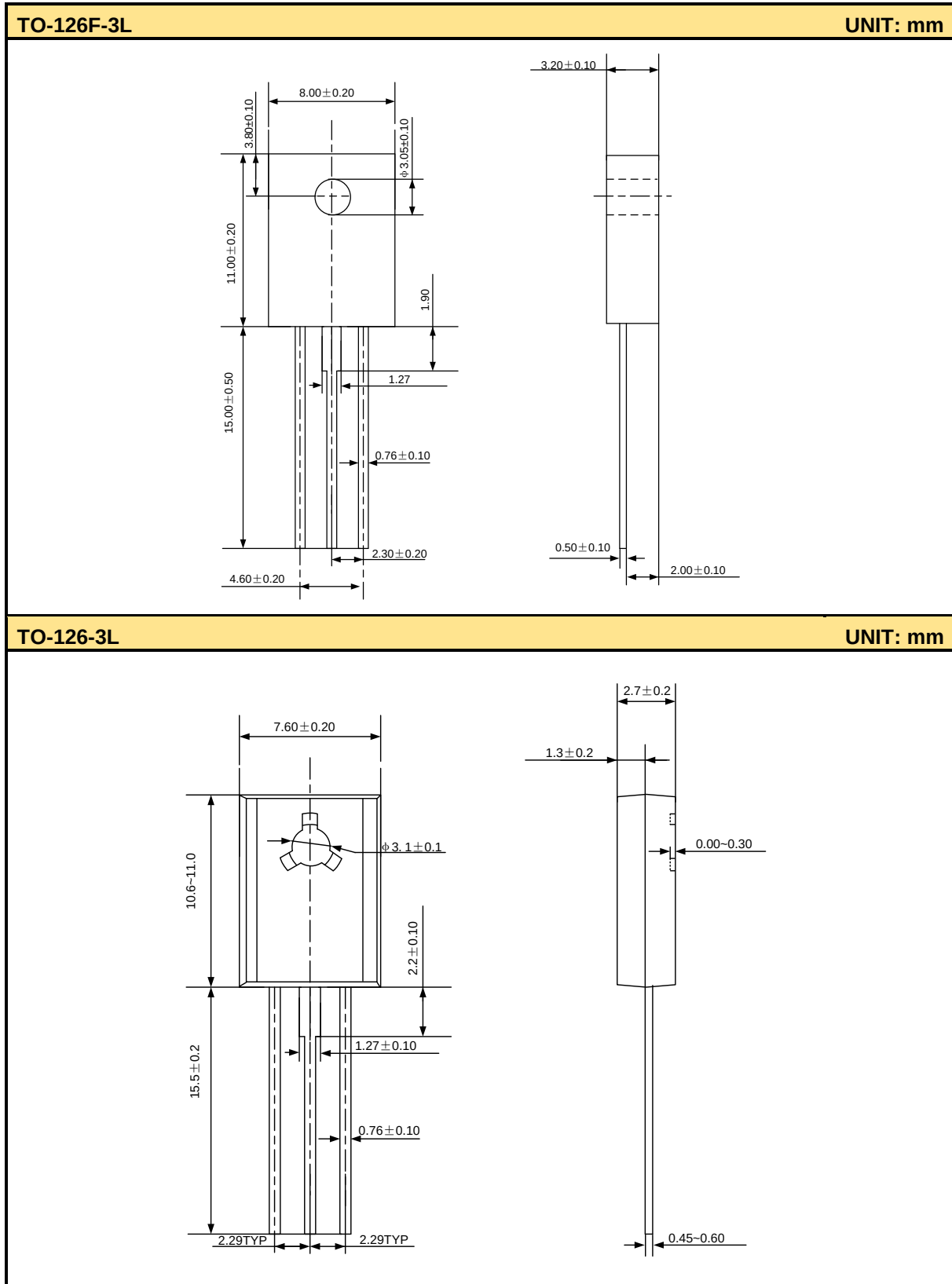
Thermal Characteristics

Characteristics	Symbol	Ratings						Unit
		GGVF2 N60M/ D	GGVF2N6 0MJ	GGVF2 N60N	GGVF2 N60NF	GGVF 2N60 T	GGVF N60F(G)	
Thermal Resistance, Junction-to-Case	R _{θJC}	3.7	3.57	4.17	7.81	2.86	5.56	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	110	110	62.5	120	62.5	120	°C/W

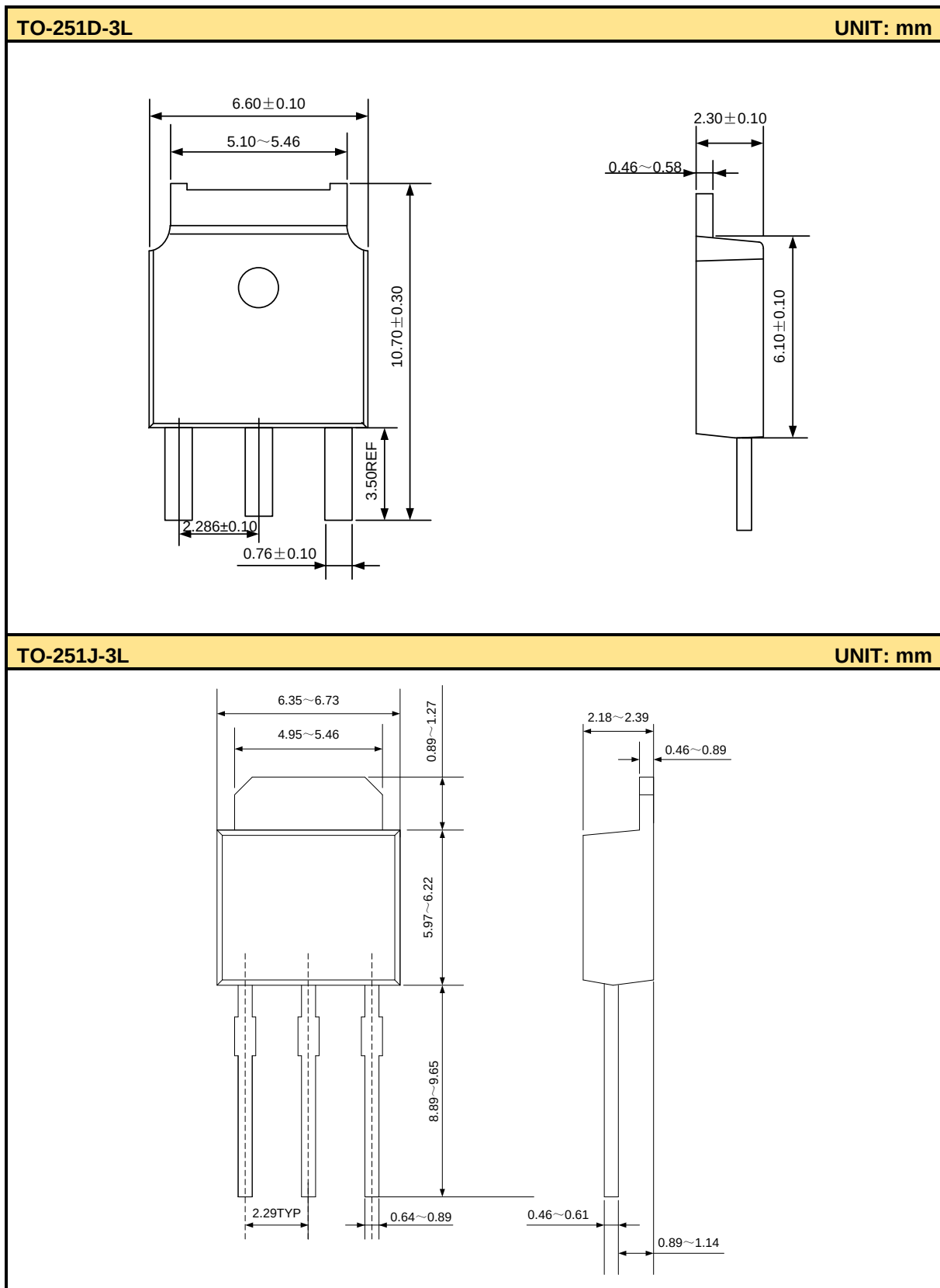
Electrical Characteristics (T_C=25°C, Unless Otherwise Specified)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	B _{VDS}	V _{GS} =0V, I _D =250μA	600	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, 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	--	3.7	4.2	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	--	250.1	--	pF
Output Capacitance	C _{oss}		--	35.7	--	
Reverse Transfer Capacitance	C _{rss}		--	1.1	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, I _D =2.0A, R _G =25Ω (Note 2,3)	--	9.2	--	ns
Turn-on Rise Time	t _r		--	23.4	--	
Turn-off Delay Time	t _{d(off)}		--	15.3	--	
Turn-off Fall Time	t _f		--	20.1	--	
Total Gate Charge	Q _g	V _{DS} =480V, I _D =2.0A, V _{GS} =10V (Note 2,3)	--	5.67	--	nC
Gate-Source Charge	Q _{gs}		--	1.74	--	
Gate-Drain Charge	Q _{gd}		--	1.99	--	

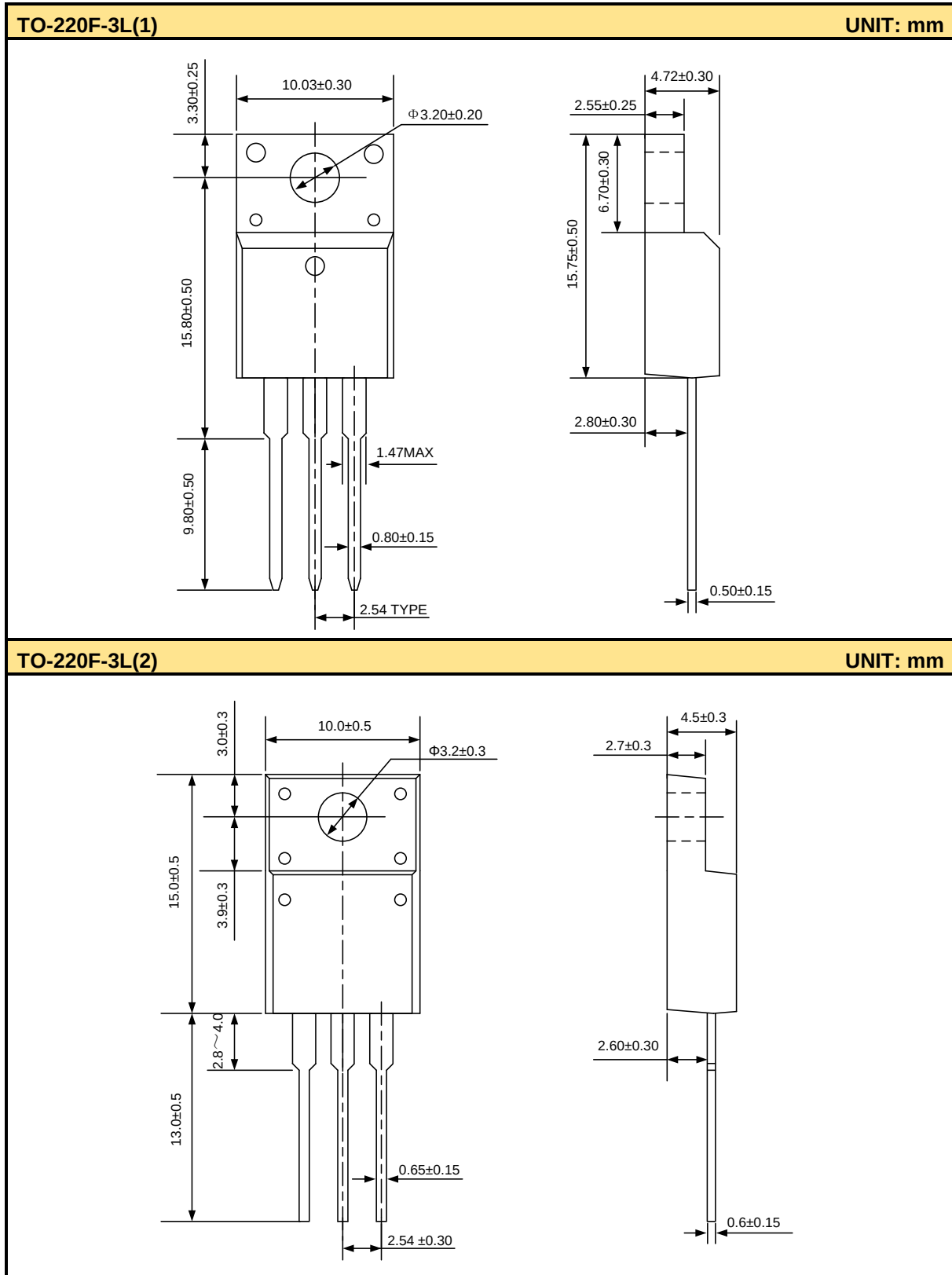
Package Outline



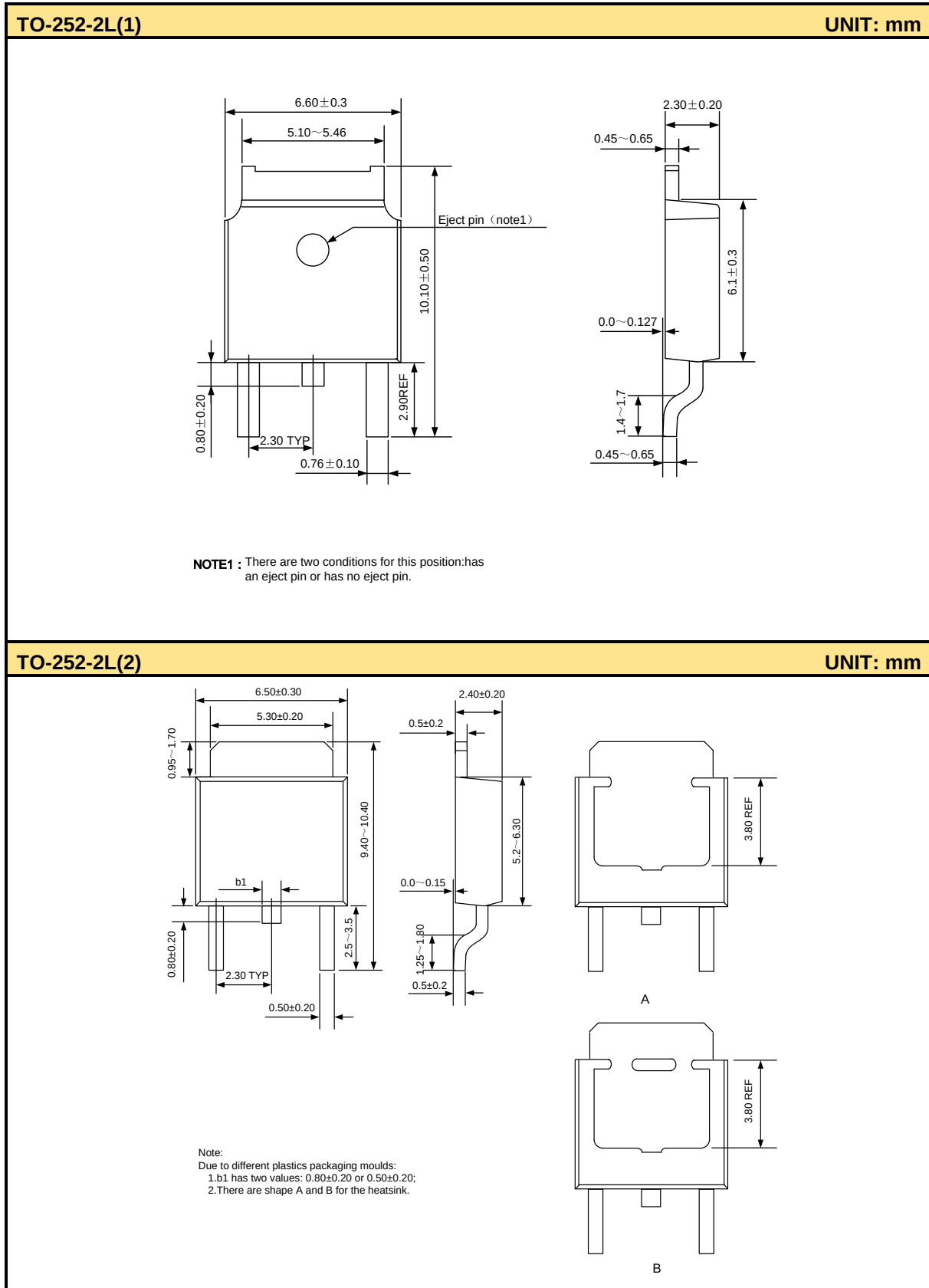
Package Outline (continued)



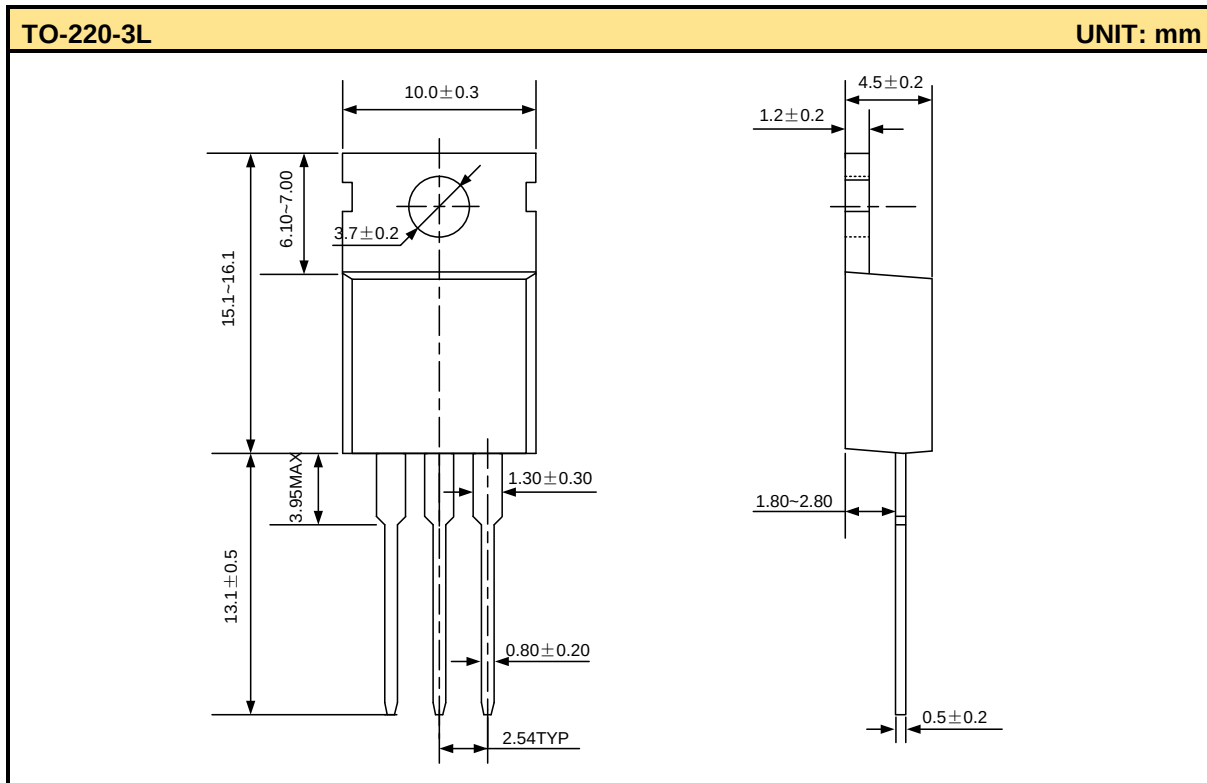
Package Outline (continued)



Package Outline (continued)



Package Outline (continued)



Disclaimer:

The information furnished in this data sheet is believed to be accurate and reliable. However, no responsibility is assumed by Golden Gate Integrated Circuits (GGIC) for its use. GGIC reserves the right to change circuitry and specifications at any time without notification to the customer.

- Golden Gate Integrated Circuits reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Golden Gate Integrated Circuits products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Golden Gate Integrated Circuits products could cause loss of body injury or damage to property.
- Golden Gate Integrated Circuits (GGIC) Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of GGIC Products for use in life support appliances, devices, or systems is a Purchaser's own risk and Purchaser agrees to fully indemnify GGIC for any damages resulting from such use or sale.