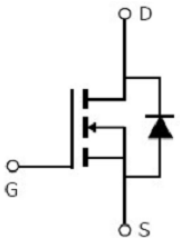
Main Product Characteristics:

V_{DSS}	650V
R_{DS}(on)	0.23Ω (typ.)
I_D	15A

TO-220F

Marking and Pin Assignments



Schematic Diagram

Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature

Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating:

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V ①	15	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V ①	9.5	
I_{DM}	Pulsed Drain Current ②	45	
P_D @T_C = 25°C	Power Dissipation ③	32	W
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=20mH	382	mJ
I_{AS}	Avalanche Current @ L=20mH	6.2	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

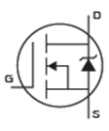
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	3.9	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	62.5	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

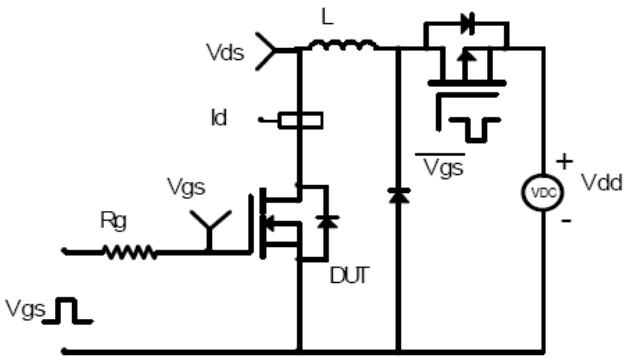
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	650	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.23	0.29	Ω	V_{GS}=10V,I_D = 7.5A
$V_{GS(th)}$	Gate threshold voltage	2.7	—	3.7	V	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 650V,V_{GS} = 0V
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =30V
		—	—	-100		V_{GS} = -30V
C_{iss}	Input capacitance	—	1184	—	pF	V_{GS} = 0V V_{DS} = 100V f = 100kHz
C_{oss}	Output capacitance	—	47	—		
C_{rss}	Reverse transfer capacitance	—	1.65	—		
Q_g	Total gate charge	—	20	—	nC	I_D = 8A, V_{DS}=400V, V_{GS} = 10V
Q_{gs}	Gate-to-Source charge	—	5	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	7	—		
$t_{d(on)}$	Turn-on delay time	—	25	—	nS	V_{GS}=10V, V_{DD} =300V, R_{GEN}=10Ω,I_D =15A
t_r	Rise time	—	39	—		
$t_{d(off)}$	Turn-Off delay time	—	65	—		
t_f	Fall time	—	38	—		

Source-Drain Ratings and Characteristics

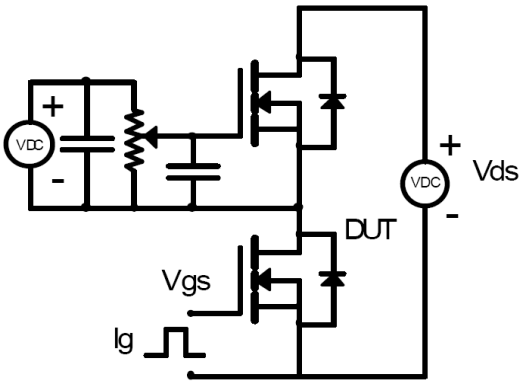
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	15	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	45	A	
V_{sd}	Diode Forward Voltage	—	—	1.3	V	I_S=15A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	260	—	nS	T_J = 25°C, I_F =8A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	3	—	uC	

Test Circuits and Waveforms

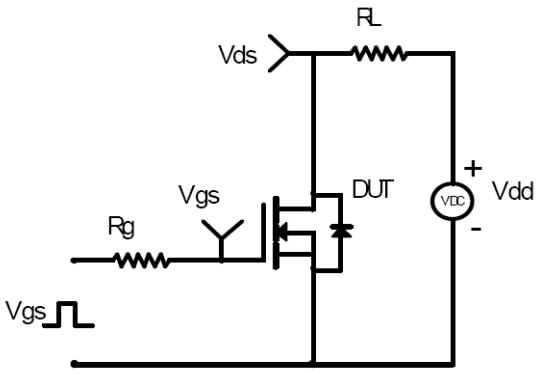
EAS Test Circuit:



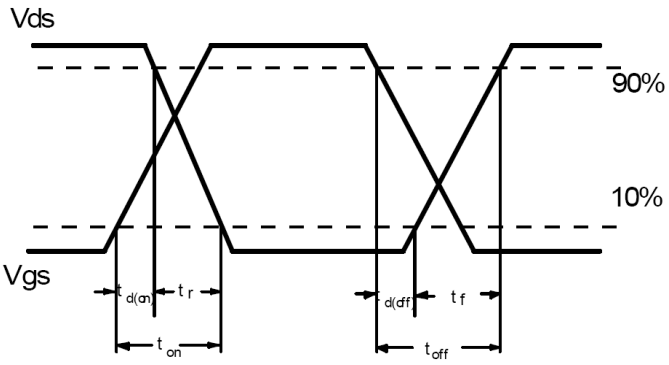
Gate Charge Test Circuit:



Switching Time Test Circuit:



Switching Waveforms:



Notes:

①The maximum current rating is limited by bond-wires.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C

Typical Electrical and Thermal Characteristics

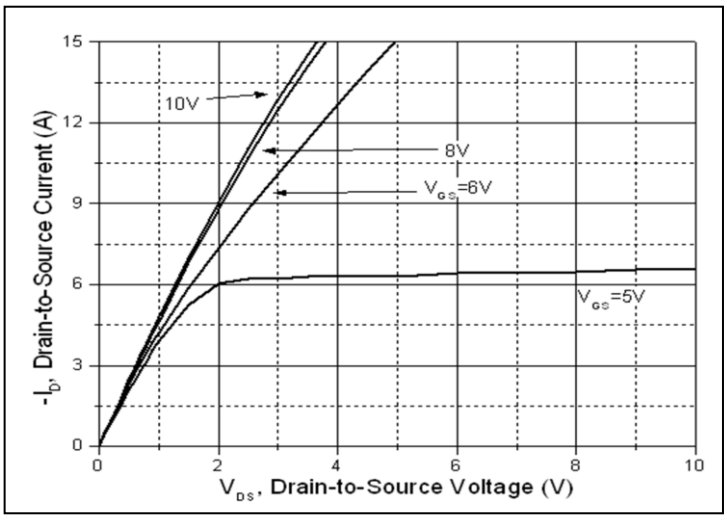


Figure 1. Typical Output Characteristics

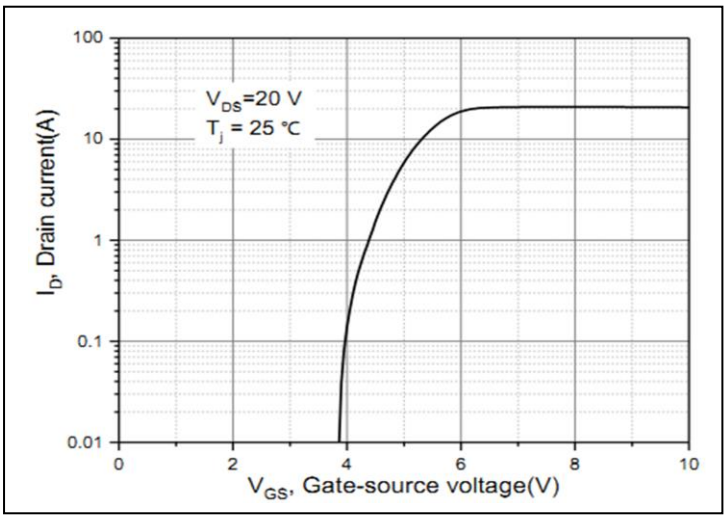


Figure 2. Typical Transfer Characteristics

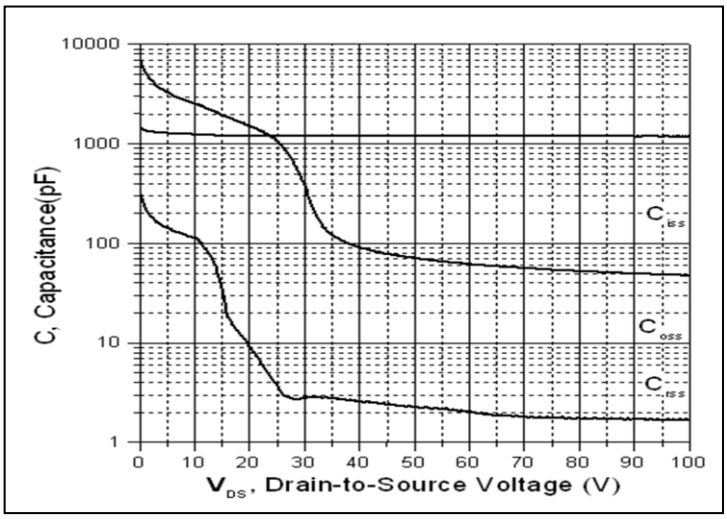


Figure 3. Typical Capacitance

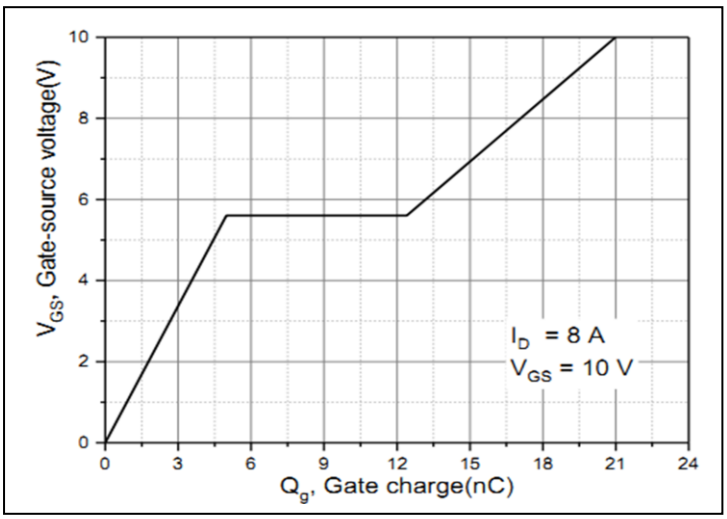


Figure 4. Typical Gate Charge

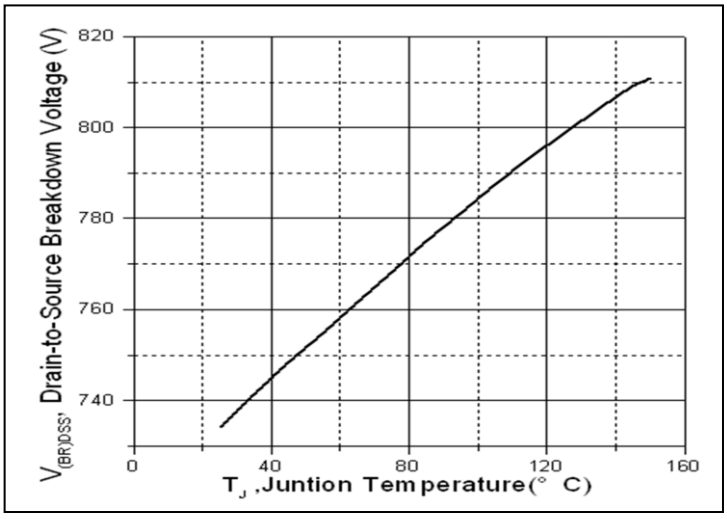


Figure 5. Drain-to-Source Breakdown Voltage vs. Temperature

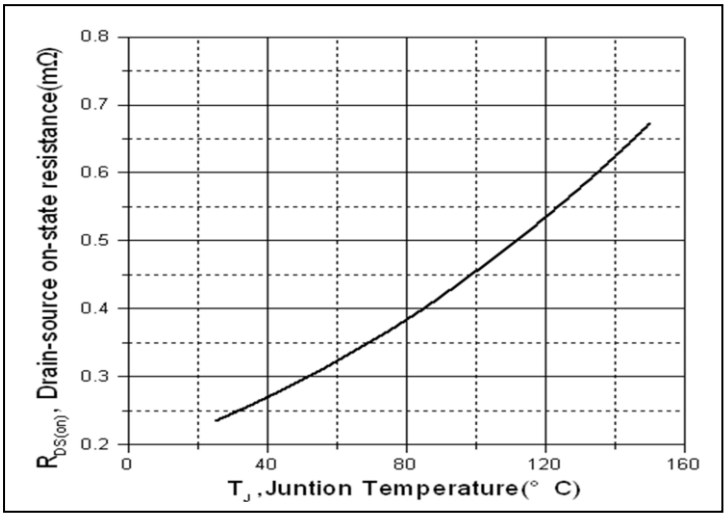


Figure 6. Normalized On-Resistance vs. Temperature

Typical electrical and thermal characteristics

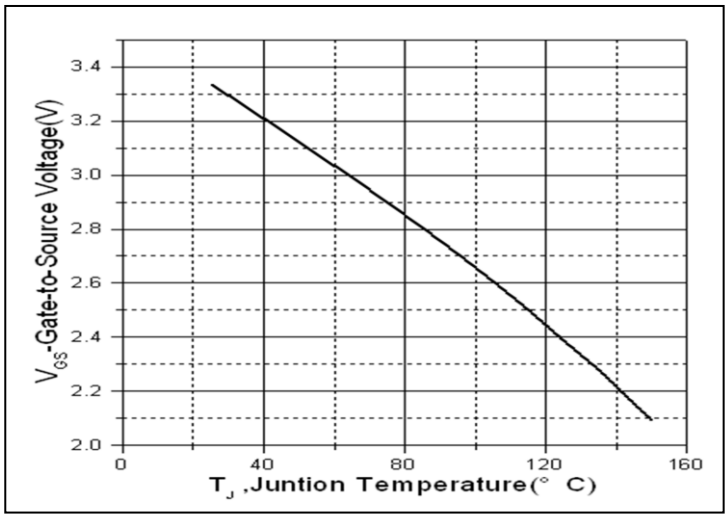


Figure7. Normalized V_{GS}(th) vs. Junction Temperature

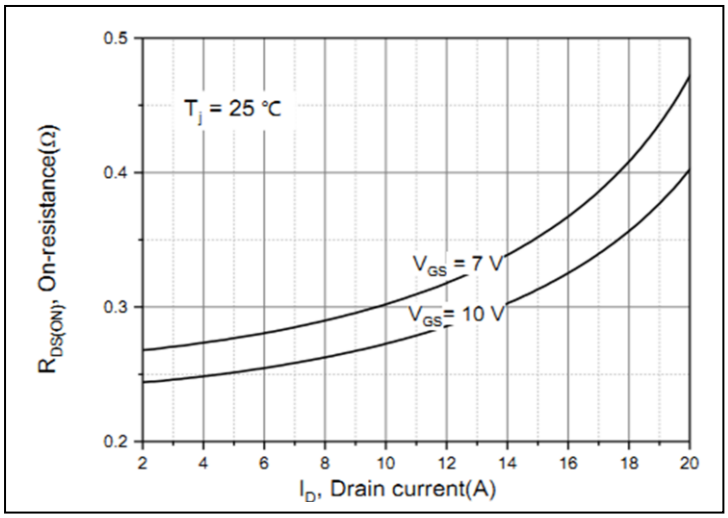


Figure8. Drain-to-Source On-state Resistance

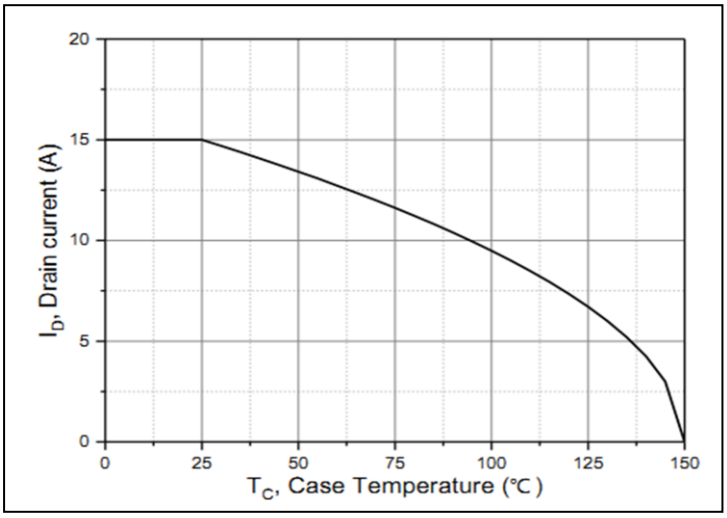


Figure9. Drain Current

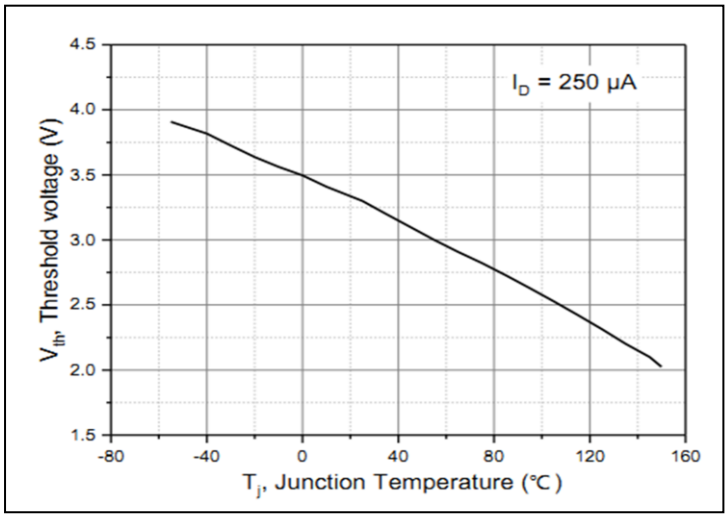


Figure10. Threshold Voltage

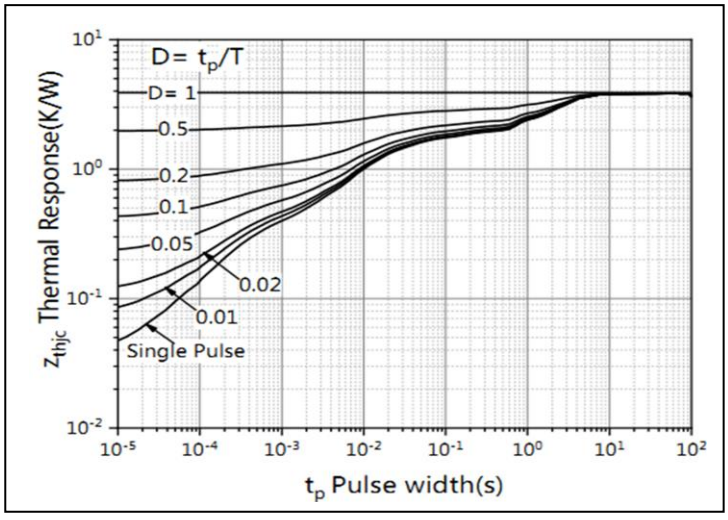


Figure11. Transient Thermal Impedance

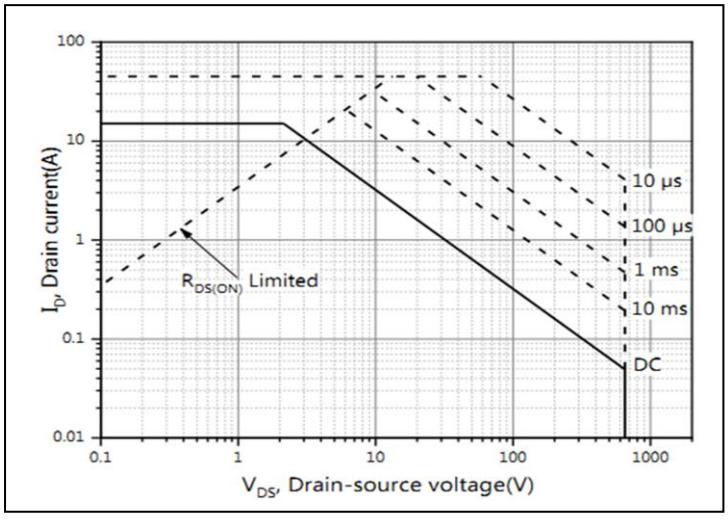
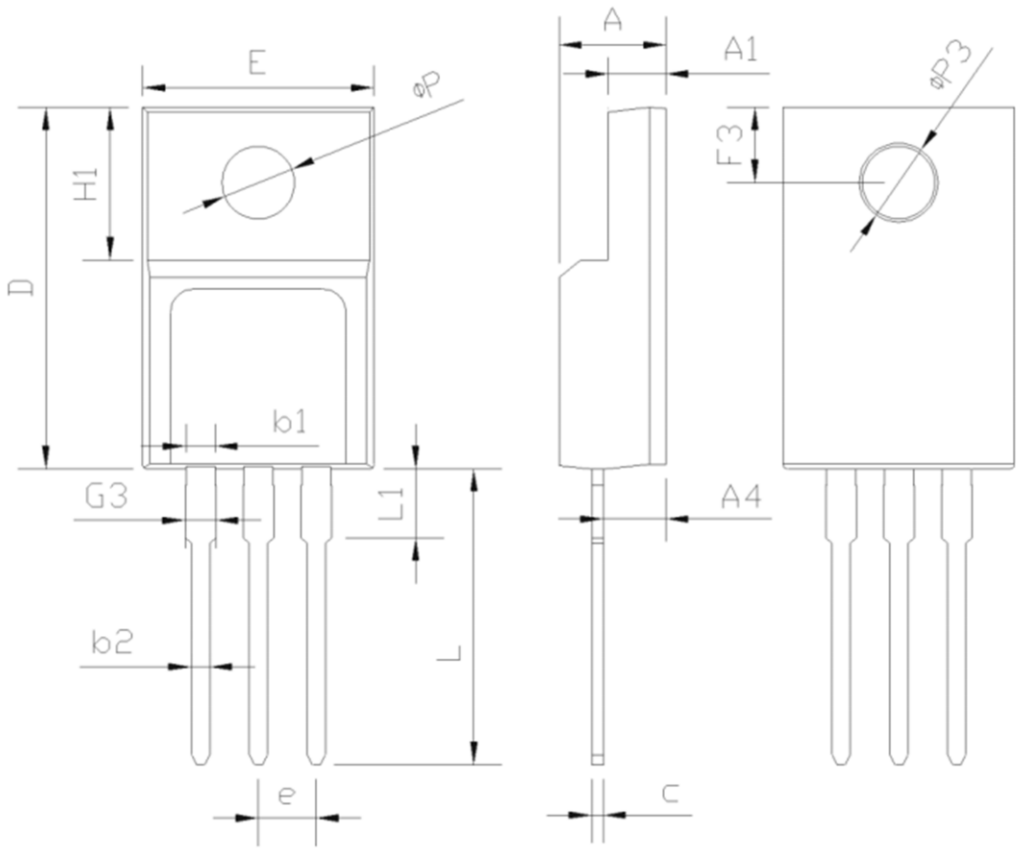


Figure12.Safe Operation Area

Mechanical Data：



SYMBOL	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1		6.70REF	
e		2.54BSC	
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

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