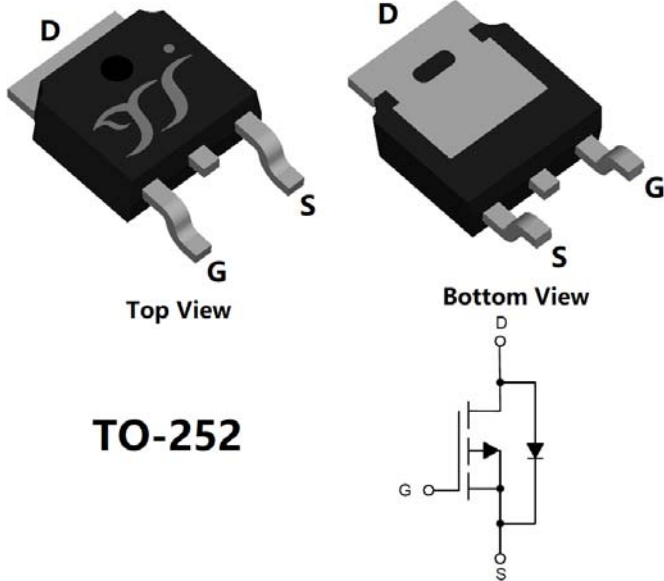


P-Channel Enhancement Mode Field Effect Transistor



TO-252

Product Summary

- V_{DS} -60V
- I_D -50A
- $R_{DS(ON)}$ (at $V_{GS}=-10V$) <12m Ω
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) <15m Ω
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Split gate trench MOSFET technology
- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Power management
- Portable equipment

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage			V_{DS}	-	-60	V
Gate-source Voltage			V_{GS}	-20	20	
Continuous Drain Current (Note 1,2)	Steady-State	$T_A=25^\circ\text{C}, V_{GS}=-10V$	I_D	-	-8	A
		$T_A=100^\circ\text{C}, V_{GS}=-10V$		-	-5	
Continuous Drain Current (Note 1,3)	Steady-State	$T_C=25^\circ\text{C}, V_{GS}=-10V$, Chip limitation		-	-50	
		$T_C=100^\circ\text{C}, V_{GS}=-10V$		-	-31	
Pulsed Drain Current	$T_C=25^\circ\text{C}, t_p \leq 10\mu\text{s}$		I_{DM}	-	-200	
Maximum Body-Diode Continuous Current	$T_C=25^\circ\text{C}$		I_S		-50	
Avalanche Energy (non-repetitive)	$T_J=25^\circ\text{C}, V_G=-10V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=-26A$		EAS	-	169	mJ
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^\circ\text{C}$	P_D	-	2	W
		$T_A=100^\circ\text{C}$		-	0.8	
Total Power Dissipation (Note 1,3)	Steady-State	$T_C=25^\circ\text{C}$		-	89	
		$T_C=100^\circ\text{C}$		-	35	
Junction and Storage Temperature Range			T_J, T_{STG}	-55	150	$^\circ\text{C}$

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	60	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	1.4	

Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD50GP06AQ	F1/F2	YJD50GP06A	2500	/	25000	13" reel



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■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A, T_j=25^\circ C$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V, T_j=25^\circ C$	-	-	-1	μA
		$V_{DS}=-60V, V_{GS}=0V, T_j=150^\circ C$	-	-	-100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^\circ C$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A, T_j=25^\circ C$	-1.2	-2	-2.8	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-25A, T_j=25^\circ C$	-	9	12	$m\Omega$
		$V_{GS}=-4.5V, I_D=-20A, T_j=25^\circ C$	-	11	15	$m\Omega$
Diode Forward Voltage	V_{SD}	$I_S=-25A, V_{GS}=0V, T_j=25^\circ C$	-	-0.9	-1.2	V
Gate Resistance	R_G	$f=1MHz, T_j=25^\circ C$	-	8.5	-	Ω
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{DS}=-30V, V_{GS}=0V, f=1MHz, T_j=25^\circ C$	-	4590	-	pF
Output Capacitance	C_{oss}		-	760	-	
Reverse Transfer Capacitance	C_{rss}		-	28	-	
Switching Parameters						
Total Gate Charge	Q_g	$V_{GS}=-10V, V_{DS}=-30V, I_D=-25A, T_j=25^\circ C$	-	79	-	nC
Gate-Source Charge	Q_{gs}		-	18	-	
Gate-Drain Charge	Q_{gd}		-	18	-	
Reverse Recovery Charge	Q_{rr}	$I_F=-25A, di/dt=100A/\mu s, V_{GS}=0V, V_R=-30V, T_j=25^\circ C$	-	67	-	nC
Reverse Recovery Time	t_{rr}		-	52	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=-10V, V_{DS}=-30V, I_D=-25A, R_{GEN}=3\Omega, T_j=25^\circ C$	-	13	-	ns
Turn-on Rise Time	t_r		-	38	-	
Turn-off Delay Time	$t_{D(off)}$		-	140	-	
Turn-off Fall Time	t_f		-	54	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of 150 $^\circ C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).



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Typical Electrical and Thermal Characteristics Diagrams

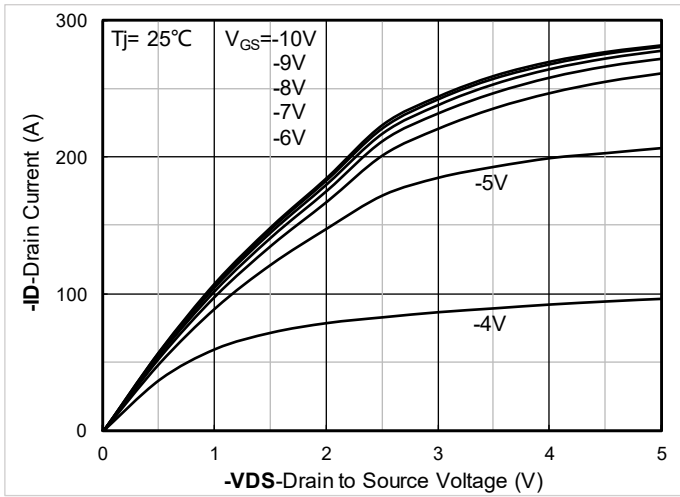


Figure 1. Output Characteristics; typical values

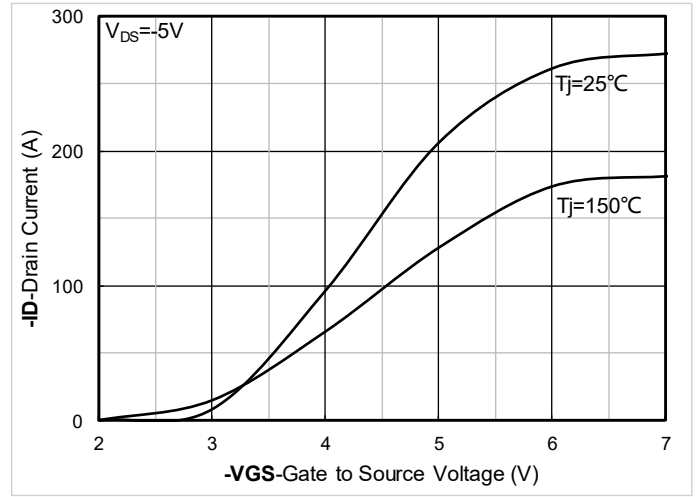


Figure 2. Transfer Characteristics; typical values

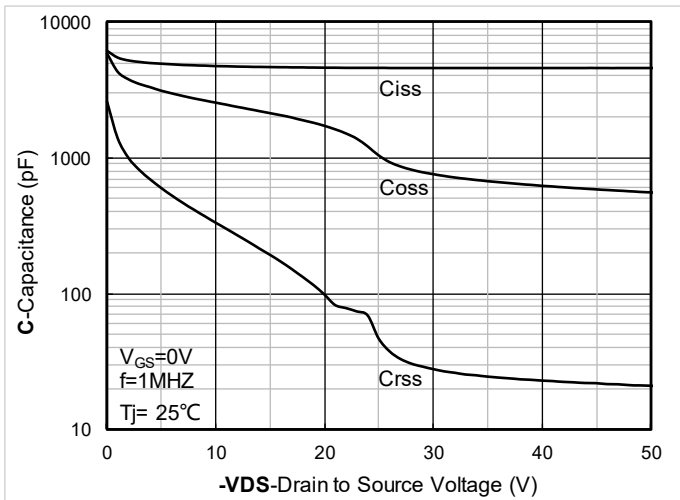


Figure 3. Capacitance Characteristics; typical values

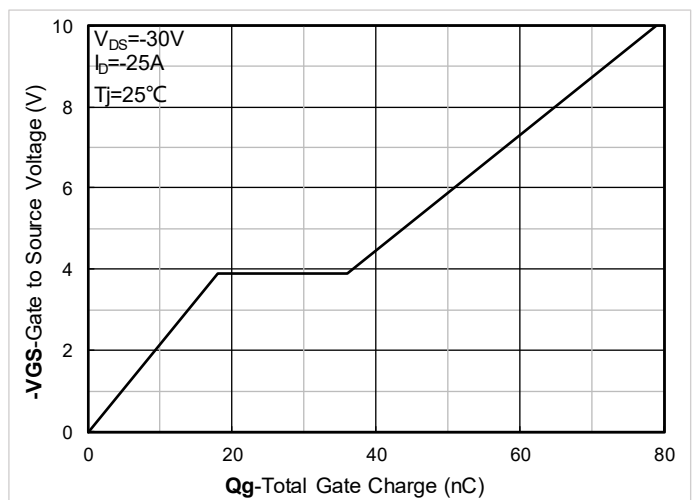


Figure 4. Gate Charge; typical values

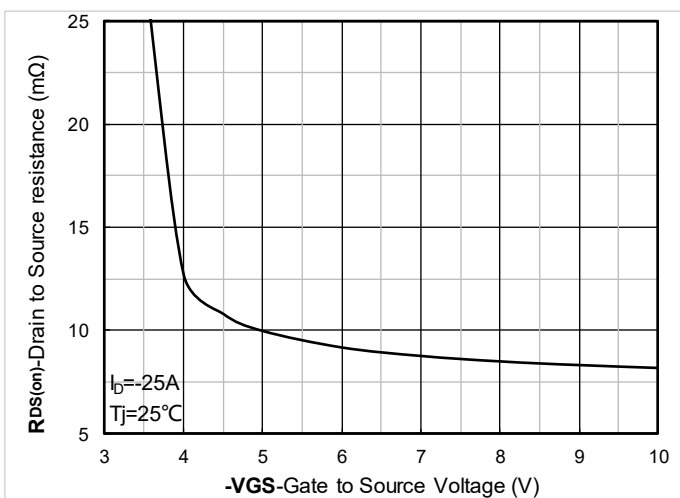


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

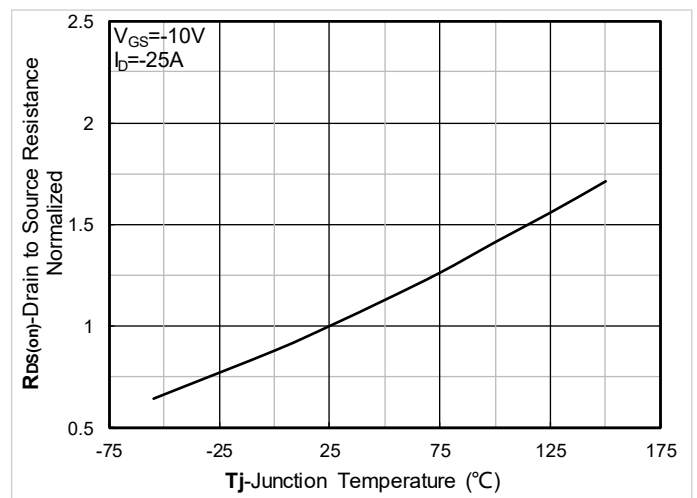


Figure 6. Normalized On-Resistance



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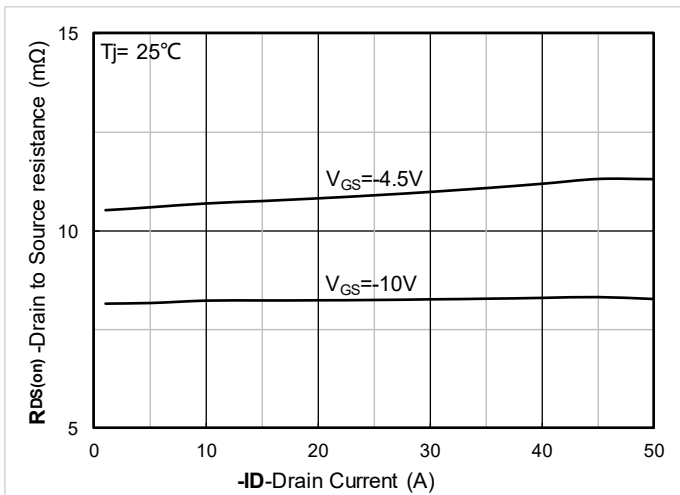


Figure 7. RDS(on) vs. Drain Current; typical values

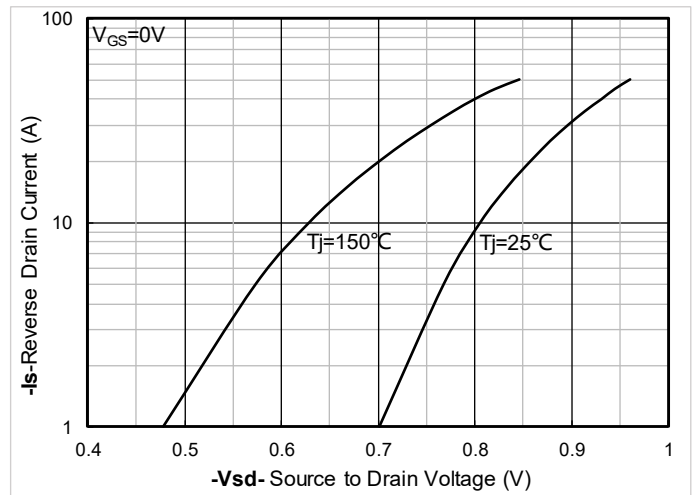


Figure 8. Forward characteristics of reverse diode; typical values

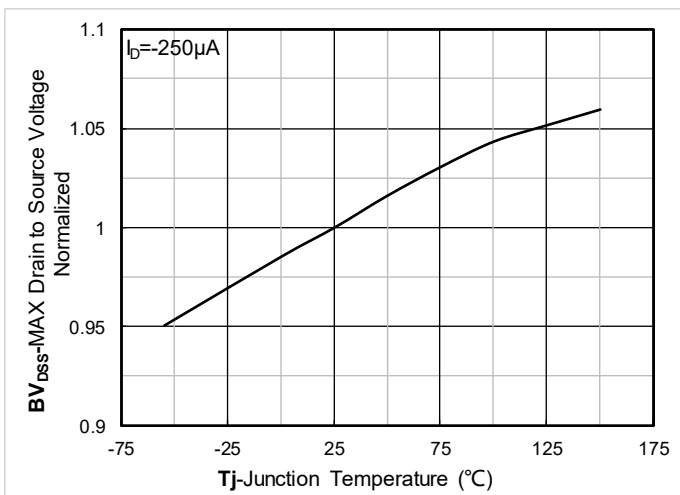


Figure 9. Normalized breakdown voltage

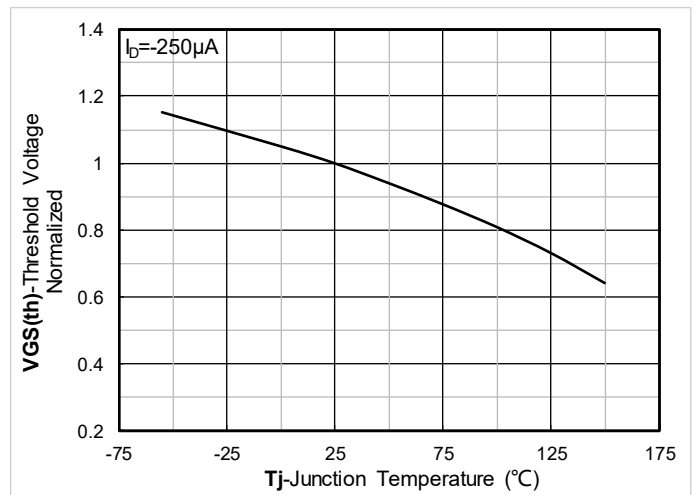


Figure 10. Normalized Threshold voltage

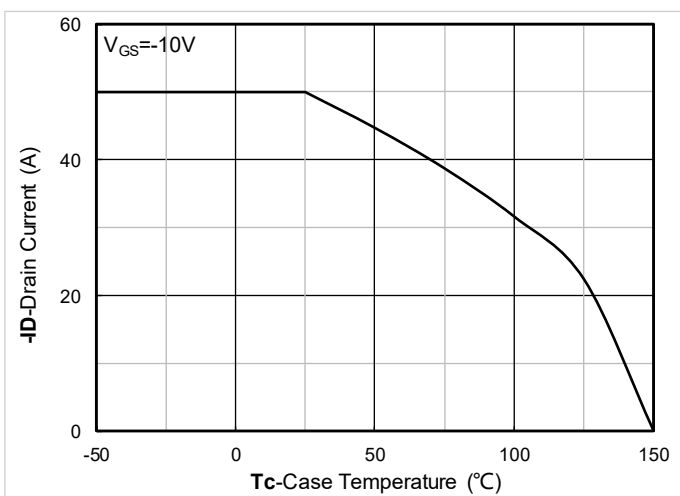


Figure 11. Current dissipation

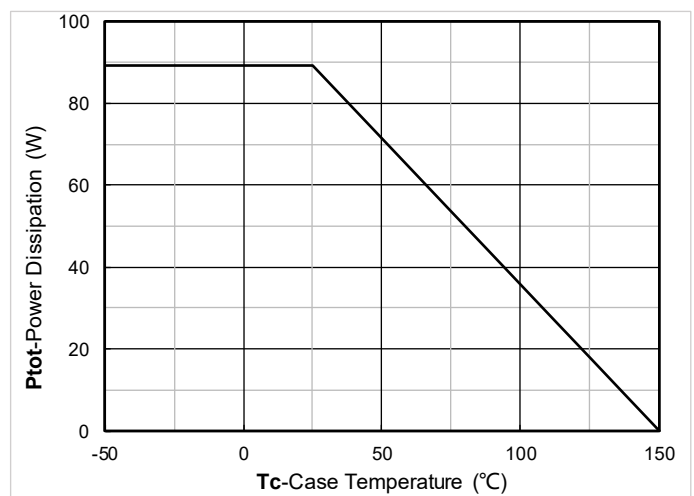


Figure 12. Power dissipation



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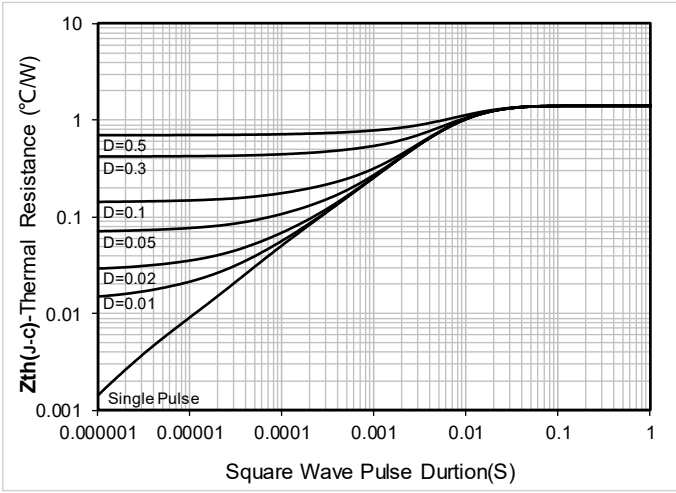


Figure 13. Maximum Transient Thermal Impedance

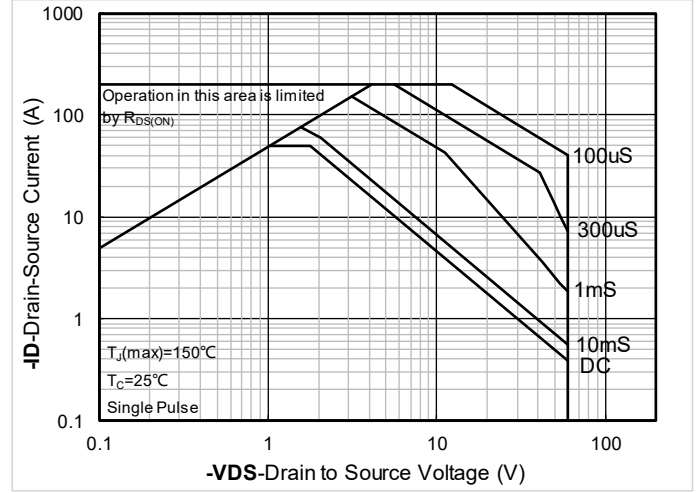
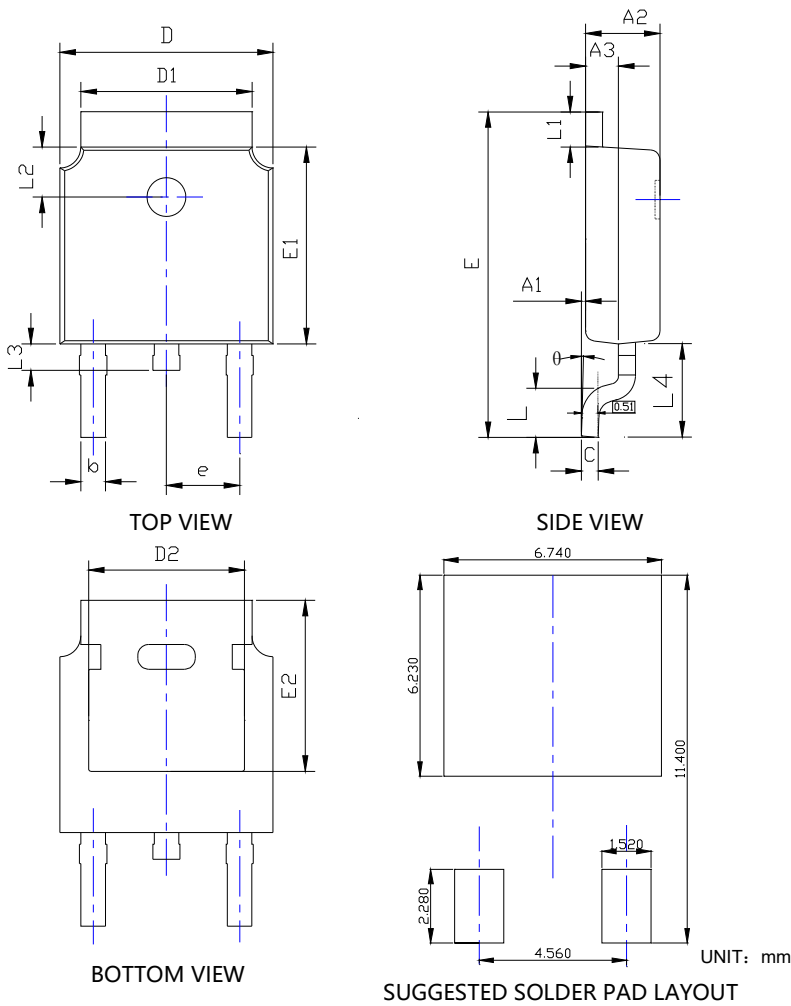


Figure 14. Safe Operation Area



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TO-252-B Package Information



SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.008	0.000	---	0.200
A2	0.087	0.091	0.094	2.200	2.300	2.400
A3	0.035	0.039	0.043	0.900	1.000	1.100
b	0.026	0.030	0.034	0.660	0.760	0.860
c	0.018	0.020	0.023	0.460	0.520	0.580
D	0.256	0.260	0.264	6.500	6.600	6.700
D1	0.203	0.209	0.215	5.150	5.300	5.450
D2	0.181	0.189	0.195	4.600	4.800	4.950
E	0.390	0.398	0.406	9.900	10.100	10.300
E1	0.236	0.240	0.244	6.000	6.100	6.200
E2	0.203	0.209	0.215	5.150	5.300	5.450
e	0.090BSC			2.286BSC		
L	0.049	0.059	0.069	1.250	1.500	1.750
L1	0.035	---	0.050	0.900	---	1.270
L2	0.055	---	0.075	1.400	---	1.900
L3	0.240	0.310	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
θ	0°	---	10°	0°	---	10°

NOTE:

- 1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
- 2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
- 3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.



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