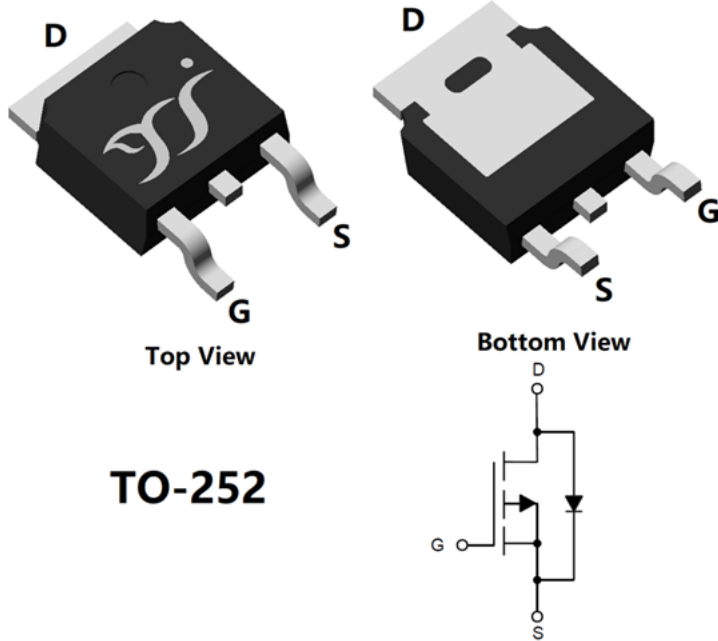


## P-Channel Enhancement Mode Field Effect Transistor



**TO-252**

### Product Summary

- $V_{DS}$  -100 V
- $I_D$  -28 A
- $R_{DS(ON)}$ ( at  $V_{GS}=-10V$ ) <55 m $\Omega$
- $R_{DS(ON)}$ ( at  $V_{GS}=-4.5V$ ) <64 m $\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Trench Power MOSFET technology
- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Power management
- Portable equipment

### ■ Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit	
Drain-source Voltage		$V_{DS}$	-100	V	
Gate-source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current (Note 1,2)	Steady-State	$T_A=25^\circ\text{C}, V_{GS}=-10V$	-4.7	A	
		$T_A=100^\circ\text{C}, V_{GS}=-10V$	-3		
Continuous Drain Current (Note 1,3)	Steady-State	$T_C=25^\circ\text{C}, V_{GS}=-10V$	-28		
		$T_C=100^\circ\text{C}, V_{GS}=-10V$	-17.7		
Pulsed Drain Current	$T_C=25^\circ\text{C}, t_p=100\mu\text{s}$	$I_{DM}$	-100	A	
Avalanche energy		$V_G=-10V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=-21.7A$	EAS	117.7	mJ
Total Power Dissipation (Note 1,2)	Steady-State	$T_A=25^\circ\text{C}$	2.5	W	
		$T_A=100^\circ\text{C}$	1		
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	$R_{\theta JA}$	40	50	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.15	1.4	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD055P10A	F1/F2	YJD055P10A	2500	/	25000	13"Reel



# YJD055P10A

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =-250μA	-100	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V	-	-	-1	μA
		V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	-100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.5	-2.0	-2.5	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	-	42	55	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A	-	46	64	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-20A, V <sub>GS</sub> =0V	-	-	-1.2	V
Gate resistance	R <sub>G</sub>	f=1MHz	-	6	-	Ω
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	-28	A
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-50V, V <sub>GS</sub> =0V, f=1MHz	-	3480	-	pF
Output Capacitance	C <sub>oss</sub>		-	145	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	118	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-50V, I <sub>D</sub> =-20A	-	71	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	10.8	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	16.8	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =-20A, di/dt=100A/us	-	47	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	32	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =-10V, V <sub>DD</sub> =-50V, I <sub>D</sub> =-20A R <sub>GEN</sub> =3Ω	-	13	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	24	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	120	-	
Turn-off fall Time	t <sub>f</sub>		-	61	-	

Note:

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. The value of R<sub>θJA</sub> is measured with the device mounted on the 40mm\*40mm\*1.1mm single layer FR-4 PCB board with 1 in<sup>2</sup> pad of 2oz. Copper, in the still air environment with T<sub>A</sub> =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Thermal resistance from junction to soldering point (on the exposed drain pad).



## Typical Electrical and Thermal Characteristics Diagrams

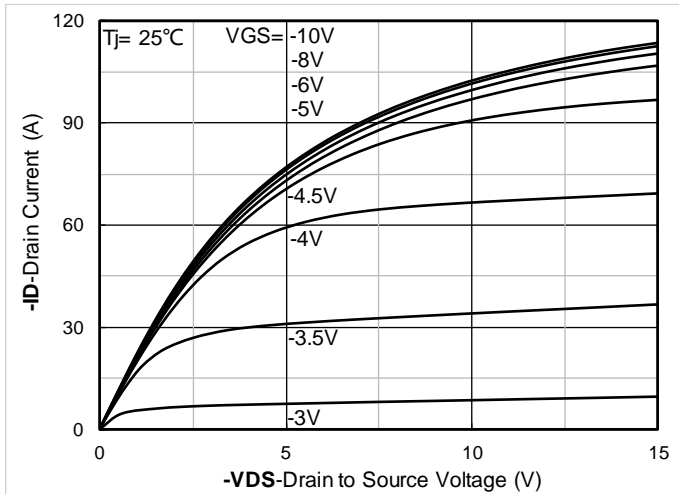


Figure 1. Output Characteristics

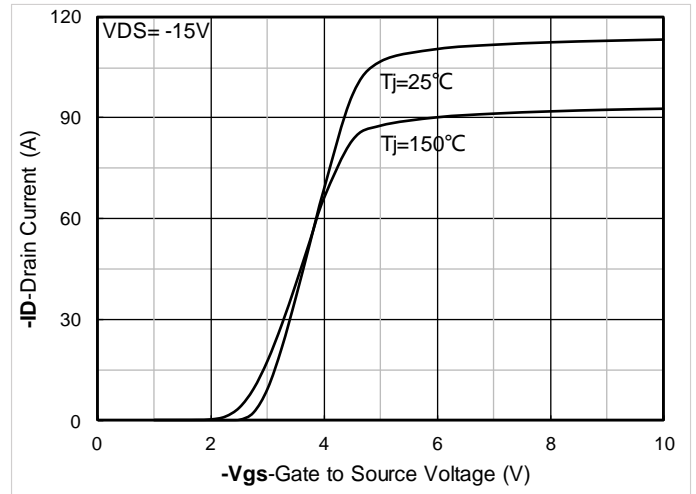


Figure 2. Transfer Characteristics

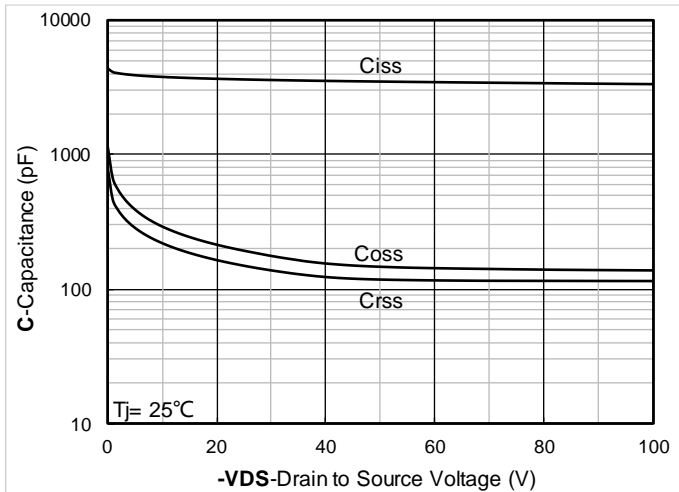


Figure 3. Capacitance Characteristics

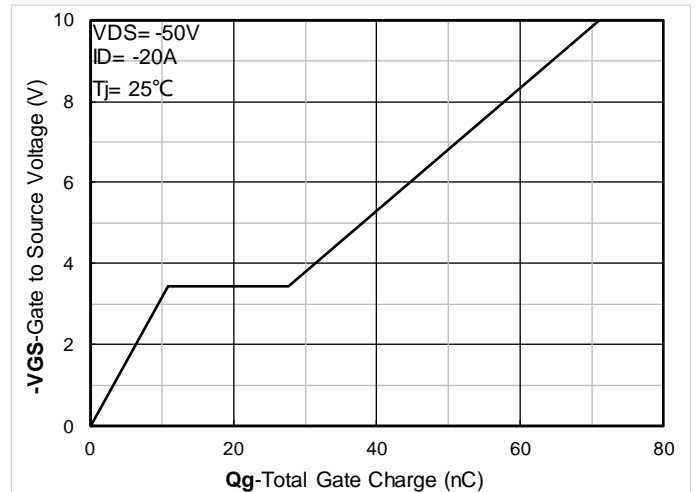


Figure 4. Gate Charge

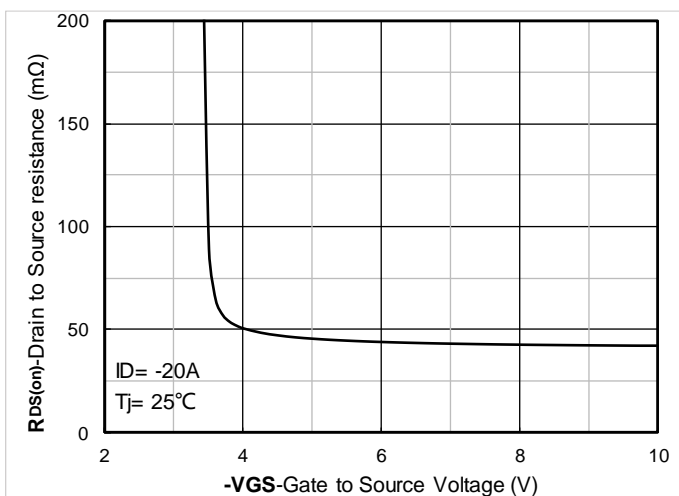


Figure 5. On-Resistance vs Gate to Source Voltage

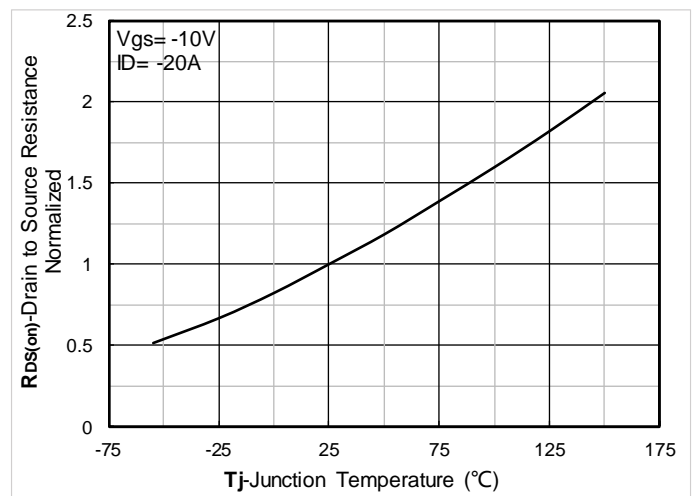


Figure 6. Normalized On-Resistance



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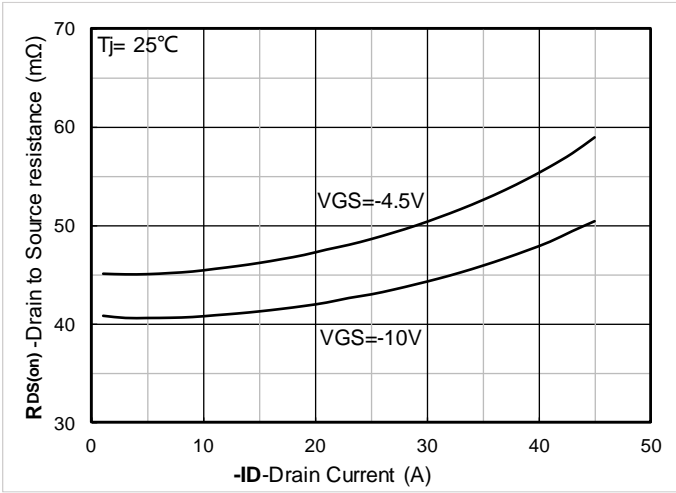


Figure 7.  $R_{DS(on)}$  VS Drain Current

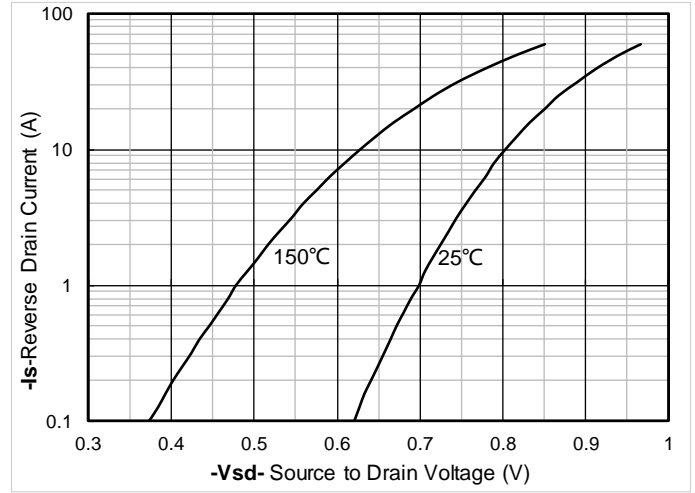


Figure 8. Forward characteristics of reverse diode

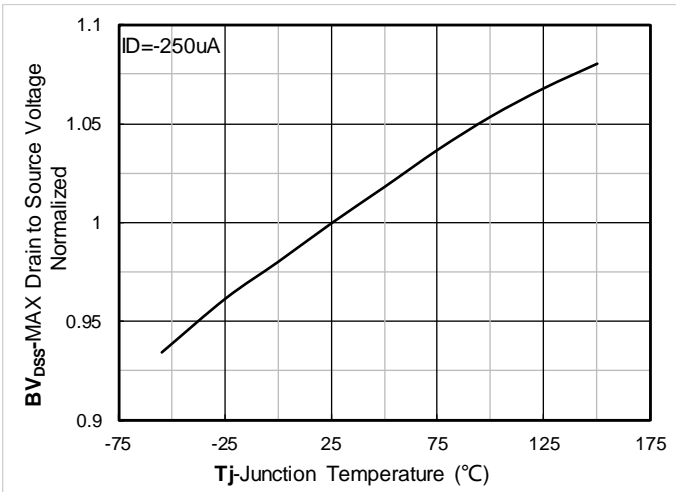


Figure 9. Normalized breakdown voltage

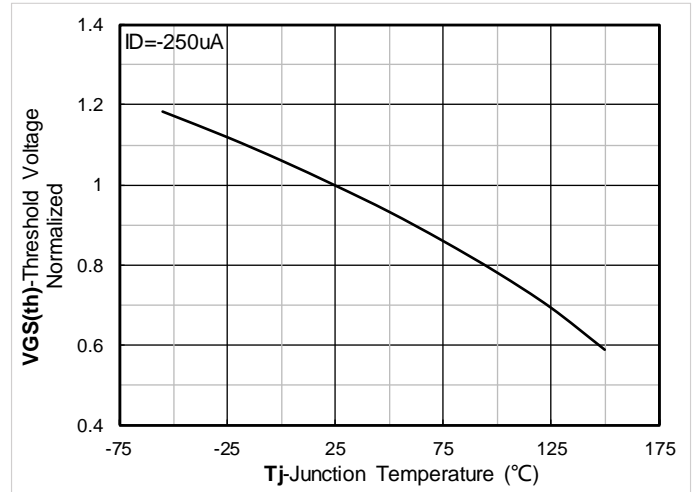


Figure 10. Normalized Threshold voltage

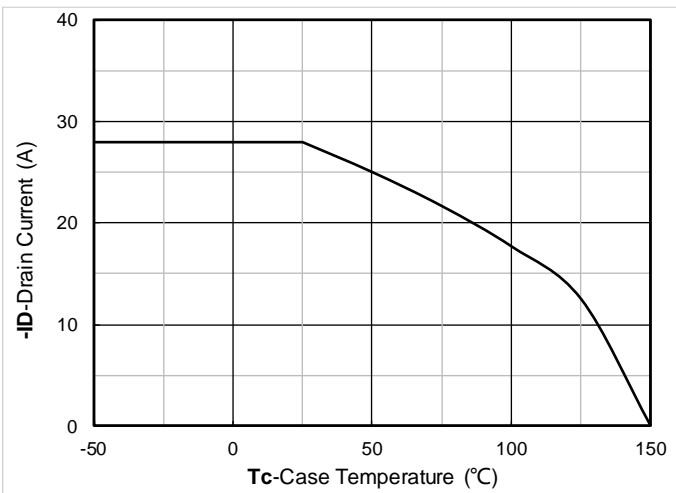


Figure 11. Current dissipation

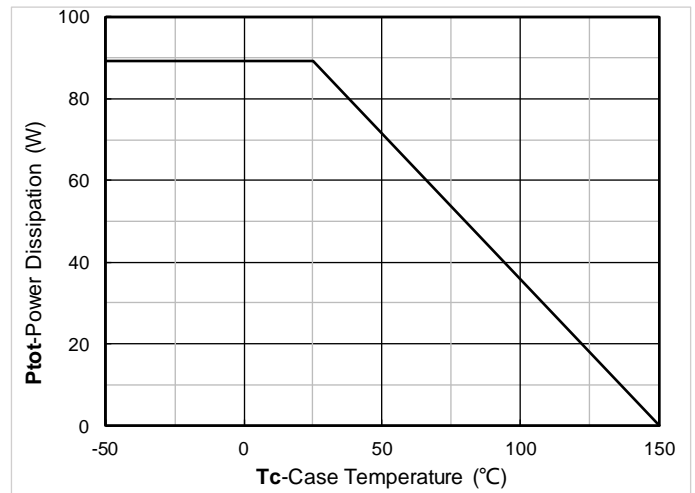


Figure 12. Power dissipation



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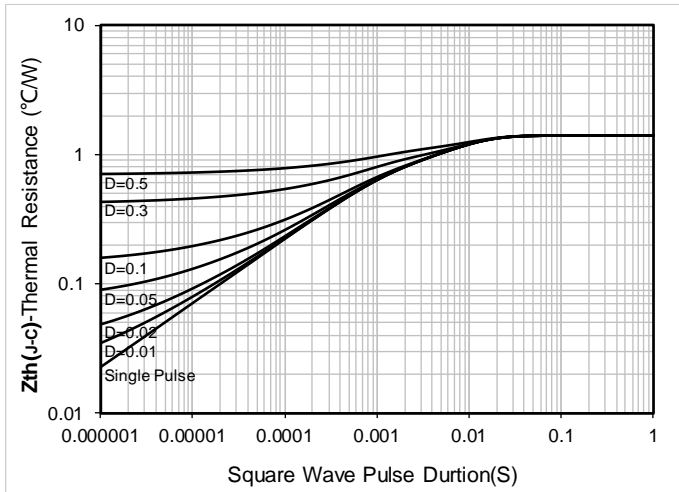


Figure 13. Maximum Transient Thermal Impedance

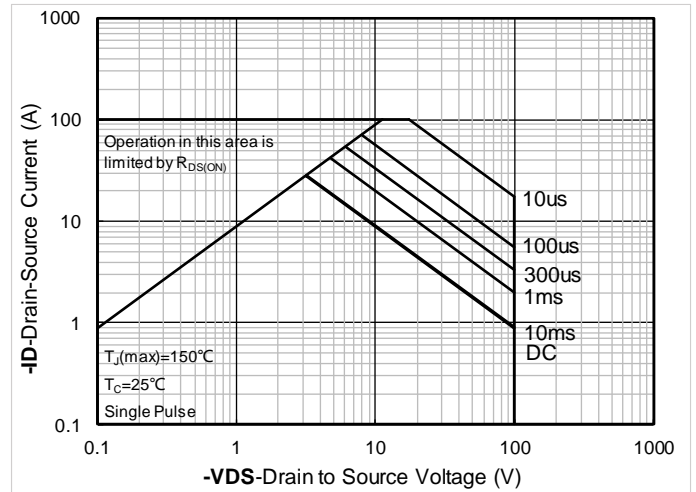
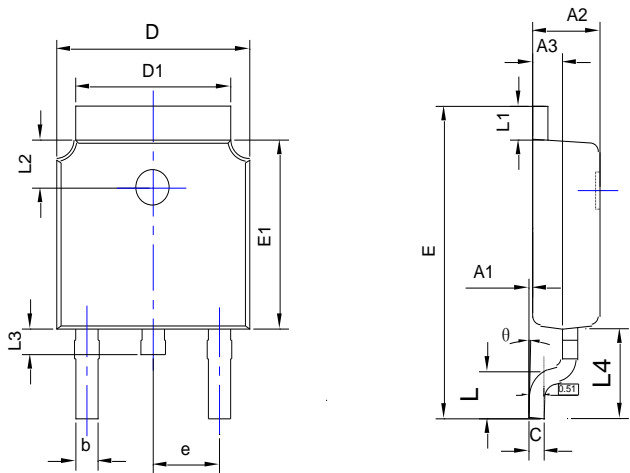


Figure 14. Safe Operation Area



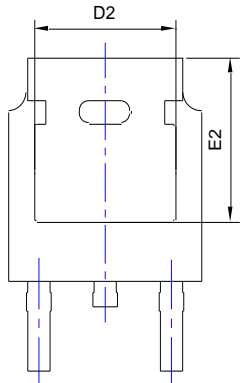
# YJD055P10A

## TO-252-B Package information

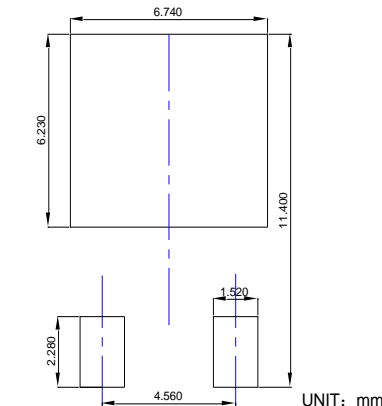


TOP VIEW

SIDE VIEW



BOTTOM VIEW



SUGGESTED SOLDER PAD LAYOUT

UNIT: mm

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	0.024	0.031	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.



## YJD055P10A

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