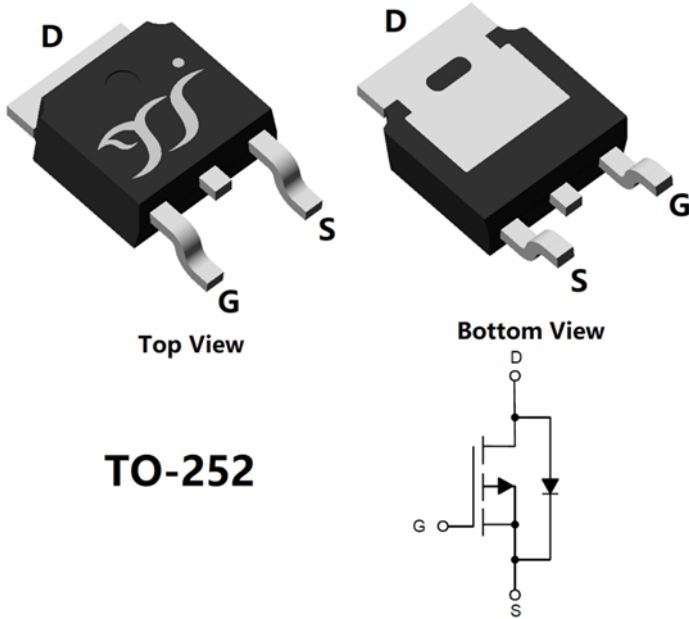


## P-Channel Enhancement Mode Field Effect Transistor



**TO-252**

### Product Summary

- $V_{DS}$  -60V
- $I_D$  -25A
- $R_{DS(ON)}$  ( at  $V_{GS}=-10V$ ) <50 mohm
- $R_{DS(ON)}$  ( at  $V_{GS}=-4.5V$ ) <65 mohm
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Split gate trench MOSFET technology
- Low  $R_{DS(on)}$  & FOM
- Low  $C_{rss}$
- Extremely low switching loss
- Excellent stability and uniformity
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Industrial and Motor Drive applications

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	-60	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_c=25^\circ\text{C}$	$I_D$	-25	A
	$T_c=100^\circ\text{C}$		-16	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	-100	A
Avalanche energy <sup>B</sup>		EAS	49	mJ
Total Power Dissipation <sup>C</sup>	$T_c=25^\circ\text{C}$	$P_D$	72	W
	$T_c=100^\circ\text{C}$		28.8	
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 <sup>D</sup>	$t \leq 10\text{S}$	$R_{\theta JA}$	15	20	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State		40	50	
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.35	1.7	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD25GP06A	F1	YJD25GP06A	2500	2500	25000	13" reel



# YJD25GP06A

## ■ 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	-60			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V	T <sub>J</sub> =25°C		-1	μA
			T <sub>J</sub> =55°C		-5	
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	-1.3	-1.8	-2.5	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> =-20A		38	50	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-10A		48	65	
Gate Resistance	R <sub>g</sub>	f=1MHz, Open Drain		12		Ω
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-20A, V <sub>GS</sub> =0V		-0.95	-1.3	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-25	A
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1MHZ		1100		pF
Output Capacitance	C <sub>oss</sub>			350		
Reverse Transfer Capacitance	C <sub>rss</sub>			28		
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g(-10V)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-20A		18.7		nC
Total Gate Charge	Q <sub>g(-4.5V)</sub>			8.8		
Gate-Source Charge	Q <sub>gs</sub>			4.7		
Gate-Drain Charge	Q <sub>gd</sub>			3.0		
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =-20A, di/dt=100A/us		8.2		
Reverse Recovery Time	t <sub>rr</sub>			20.2		
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =-10V, V <sub>DD</sub> =-30V, I <sub>D</sub> =-12A R <sub>GEN</sub> =6Ω		7.5		ns
Turn-on Rise Time	t <sub>r</sub>			39.5		
Turn-off Delay Time	t <sub>D(off)</sub>			43.6		
Turn-off fall Time	t <sub>f</sub>			55.1		

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

B. V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=14A.

C. Pd is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R<sub>qJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =25 C. The Power dissipation PDSM is based on R<sub>qJA</sub> ≤ 10s and the maximum allowed junction temperature of 150 C. The value in any given application depends on the user's specific board design.



## ■ Typical Performance Characteristics

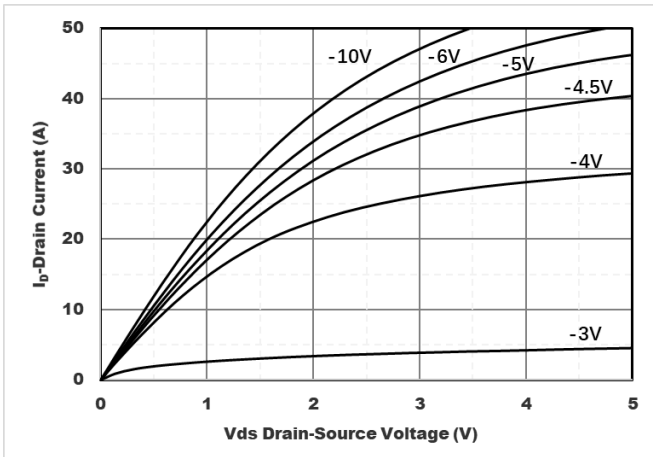


Figure1. Output Characteristics

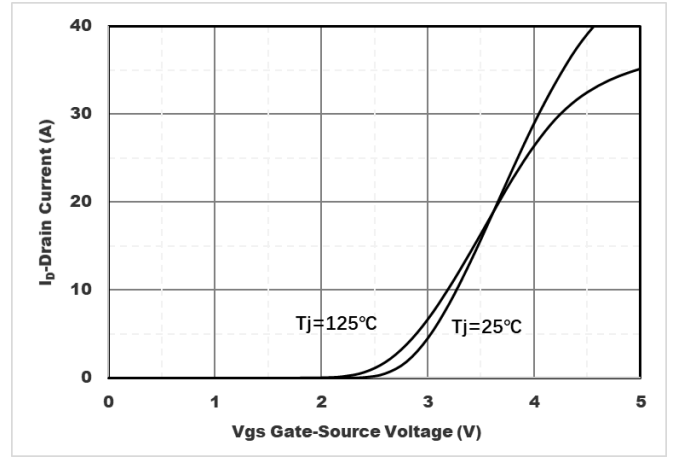


Figure2. Transfer Characteristics

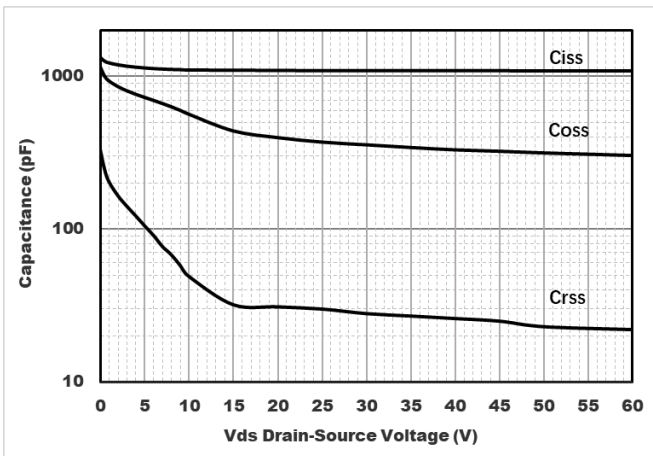


Figure3. Capacitance Characteristics

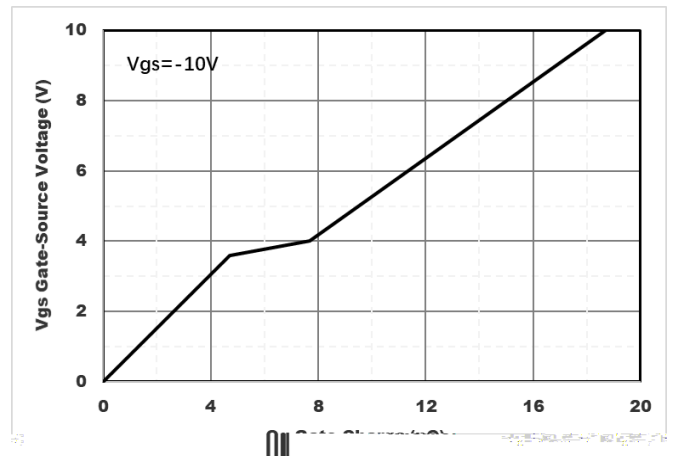


Figure4. Gate Charge

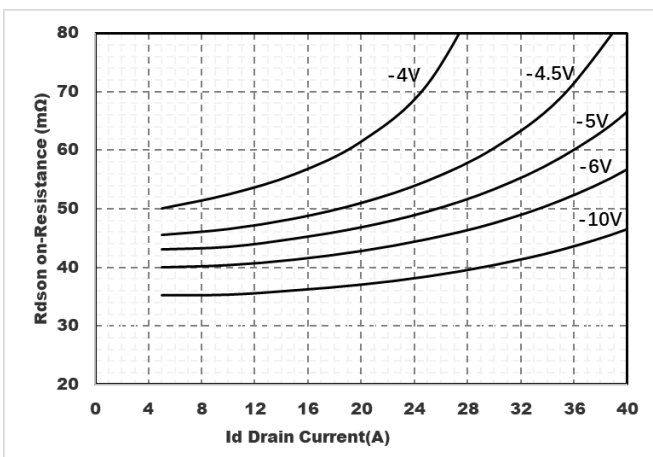


Figure5. : On-Resistance vs. Drain Current

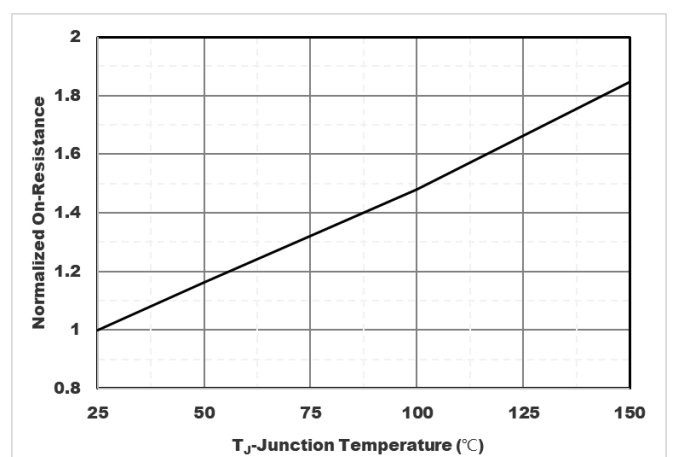


Figure6. Normalized On-Resistance



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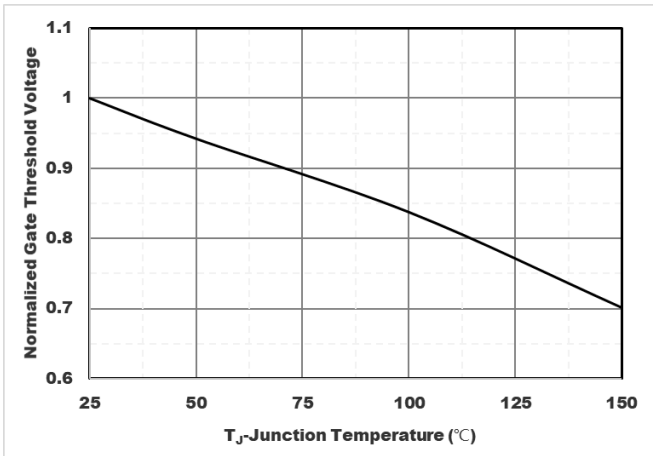


Figure 7. Normalized Gate Threshold Voltage

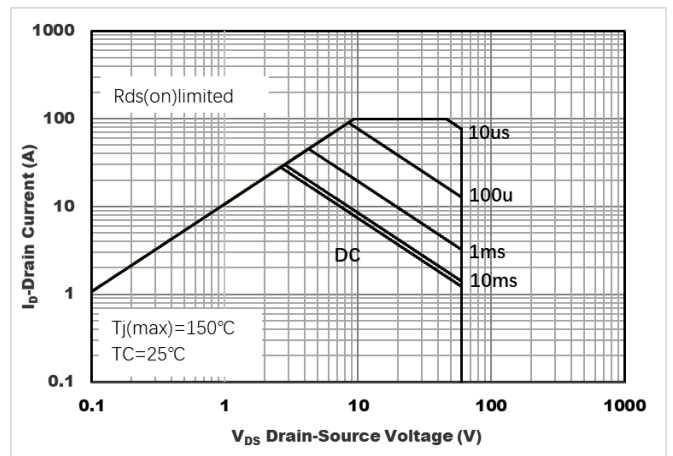


Figure 8. Safe Operation Area

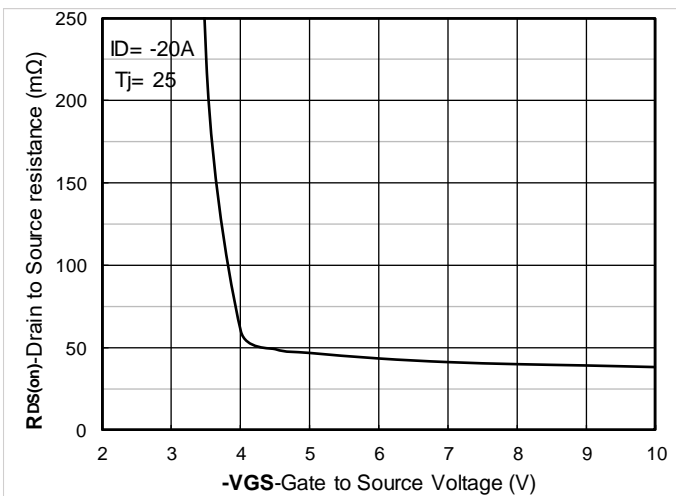


Figure 9. On-Resistance vs Gate to Source Voltage

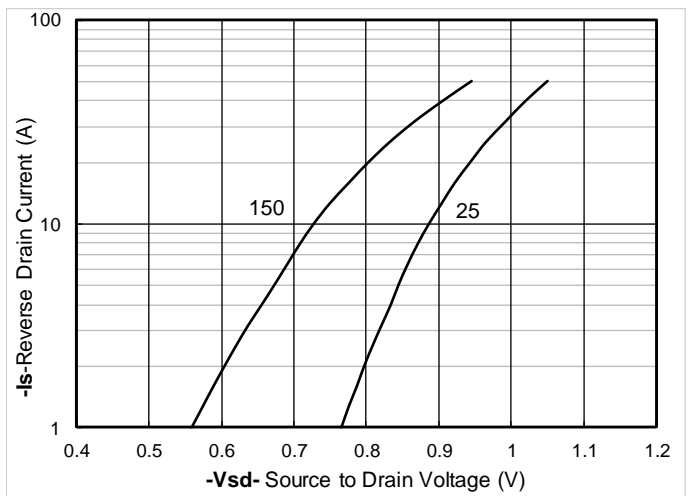


Figure 10. Forward characteristics of reverse diode

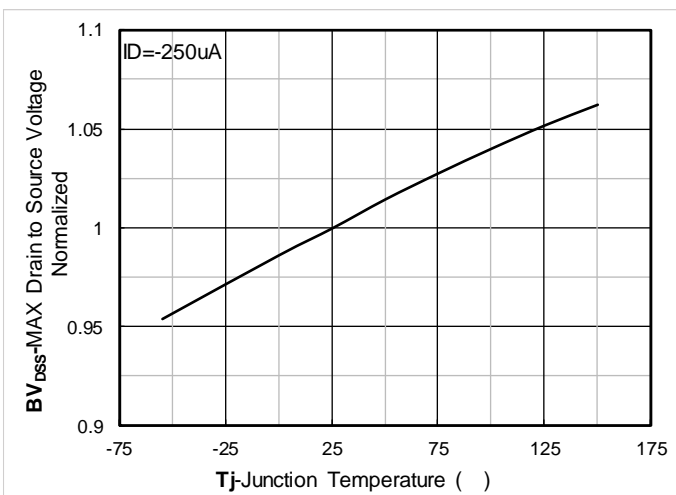


Figure 11. Normalized breakdown voltage

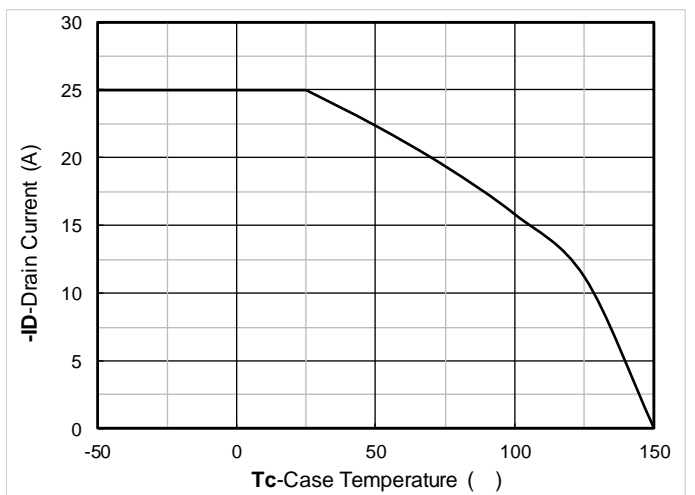


Figure 12. Current dissipation



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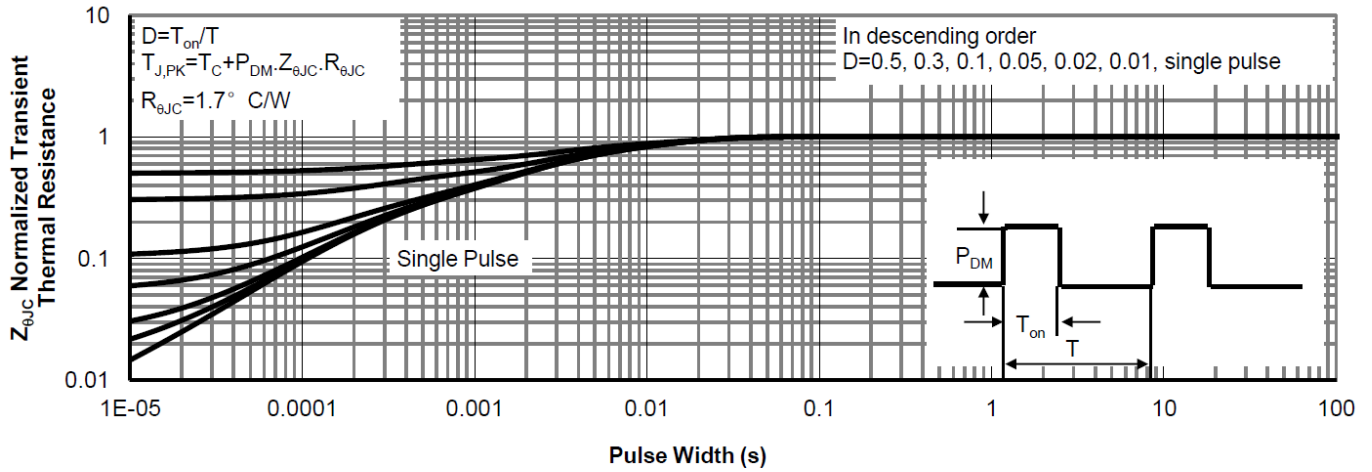
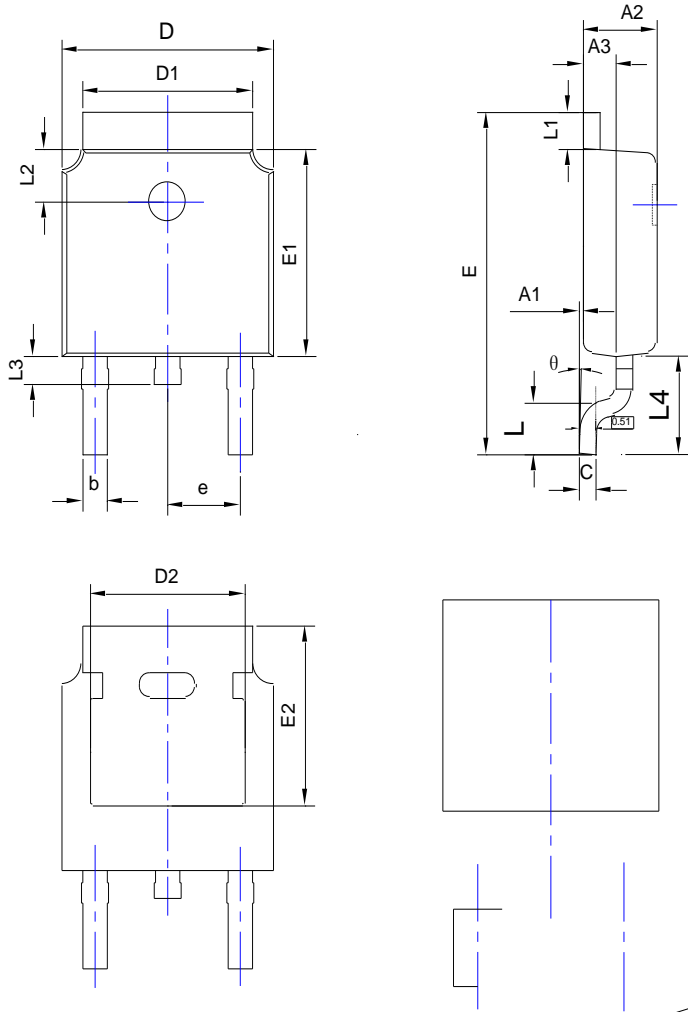


Figure13.Normalized Maximum Transient thermal impedance



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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	0.024	0.031	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
$\theta$	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.



## YJD25GP06A

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