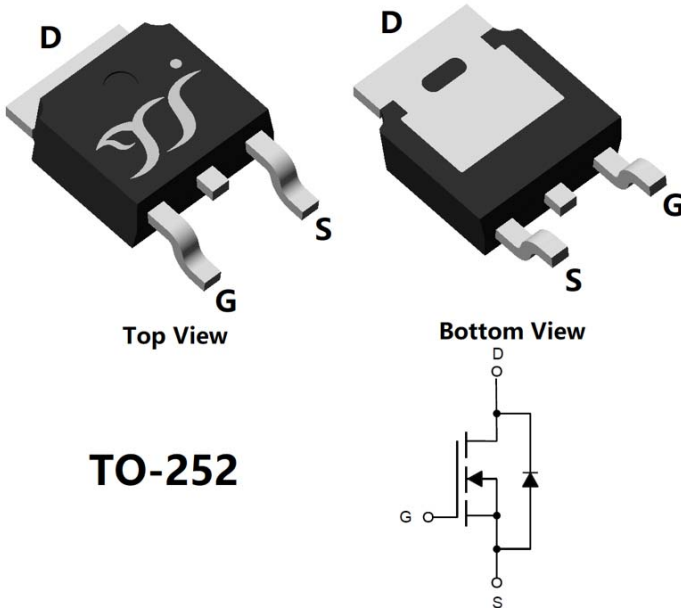


N-Channel Enhancement Mode Field Effect Transistor



TO-252

Product Summary

- V_{DS} 40 V
- I_D 60 A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) <7.0 mohm
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) <9.5 mohm
- 100% EAS Tested
- 100% ∇V_{DS} Tested
- ESD Level(HBM) Class 1C

General Description

- Trench Power LV MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- High current load applications
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_C=25^\circ\text{C}$	I_D	60	A
	$T_C=100^\circ\text{C}$		38	
Pulsed Drain Current ^A		I_{DM}	200	A
Total Power Dissipation	$T_C=25^\circ\text{C}$	P_D	44	W
	$T_C=100^\circ\text{C}$		17	W
Single Pulse Avalanche Energy ^B		E_{AS}	110	mJ
Thermal Resistance Junction-to-Case ^C		$R_{\theta JC}$	2.8	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	$^\circ\text{C}$

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD60N04A	F1/F2	YJD60N04A	2500	/	25000	13" reel



YJD60N04A

■ Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Static Parameter							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =250μA		40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V,V _{GS} =0V	T _J =25℃			1	μA
			T _J =150℃			100	
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V				±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA		1.0	1.5	2.5	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D =20A			5.4	7	mΩ
		V _{GS} = 4.5V, I _D =10A			6.8	9.5	
Diode Forward Voltage	V _{SD}	I _S =20A,V _{GS} =0V			0.8	1.2	V
Maximum Body-Diode Continuous Current	I _S					60	A
Dynamic Parameters							
Input Capacitance	C _{iss}	V _{DS} =20V,V _{GS} =0V,f=1MHZ			1860		pF
Output Capacitance	C _{oss}				256		
Reverse Transfer Capacitance	C _{rss}				205		
Switching Parameters							
Total Gate Charge	Q _g	V _{GS} =10V,V _{DS} =20V,I _D =20A			46.7		nC
Gate-Source Charge	Q _{gs}				8		
Gate-Drain Charge	Q _{gd}				11.6		
Reverse Recovery Charge	Q _{rr}	I _F =20A, di/dt=100A/us			2.3		ns
Reverse Recovery Time	t _{rr}				15		
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V,V _{DD} =20V, I _D =2A,R _L =1Ω R _{GEN} =3Ω			10		
Turn-on Rise Time	t _r				21		
Turn-off Delay Time	t _{D(off)}				36		
Turn-off fall Time	t _f				25		

A. Pulse Test: Pulse Width≤300us, Duty cycle ≤2%.

B. T_J=25℃, V_{DD}=38V, V_G=10V, L=0.5mH, I_{AS}=21A

C. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design, while R_{θJA} is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.



■ Typical Performance Characteristics

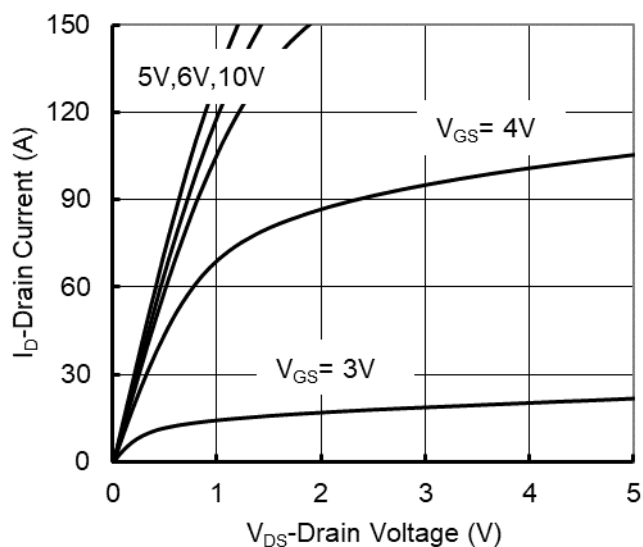


Figure 1. Output Characteristics

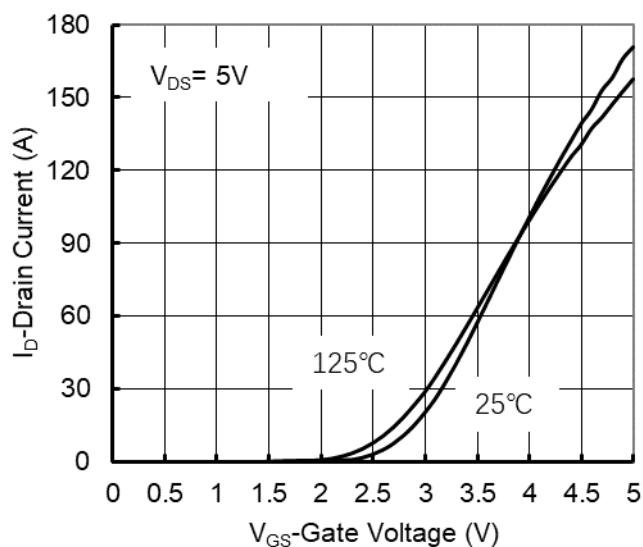


Figure 2. Transfer Characteristics

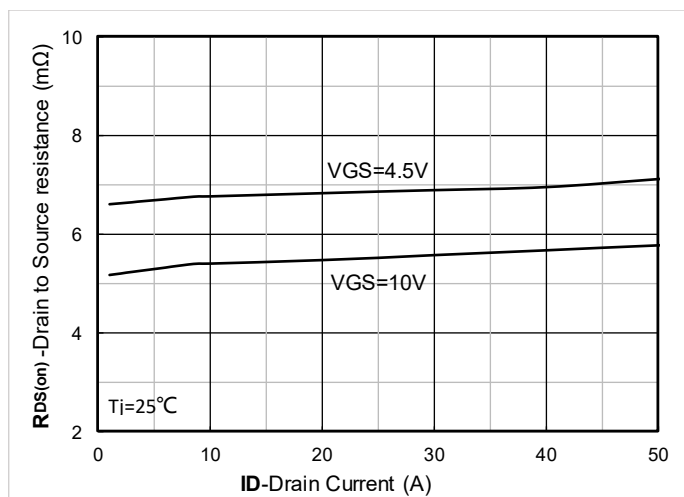


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

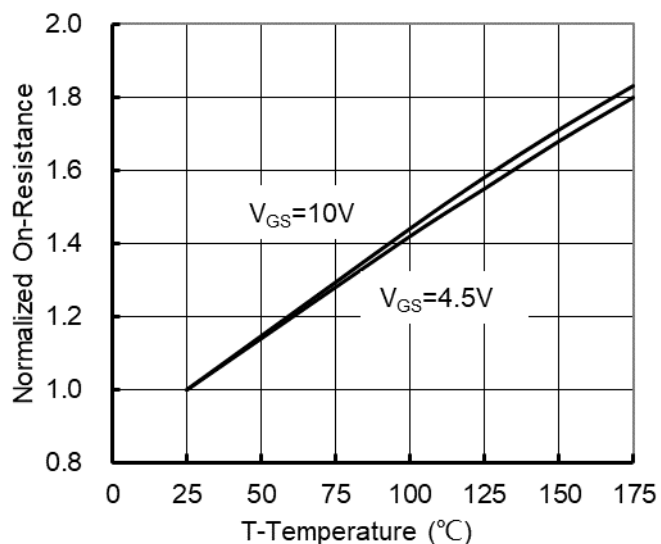


Figure 4. On-Resistance vs. Junction Temperature

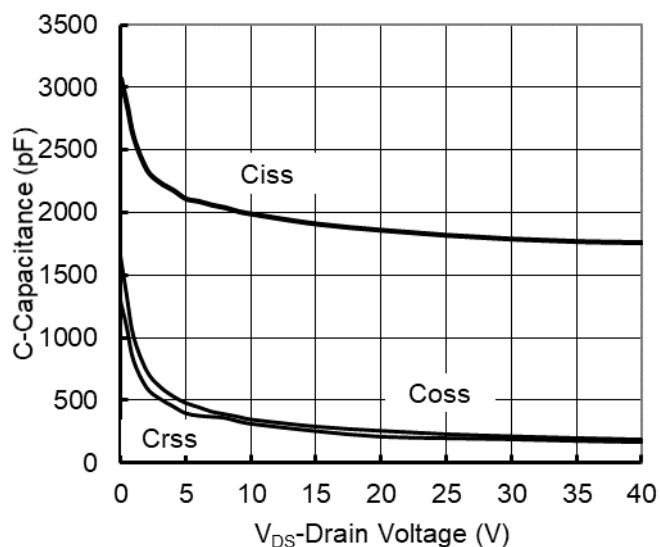


Figure 5. Capacitance Characteristics

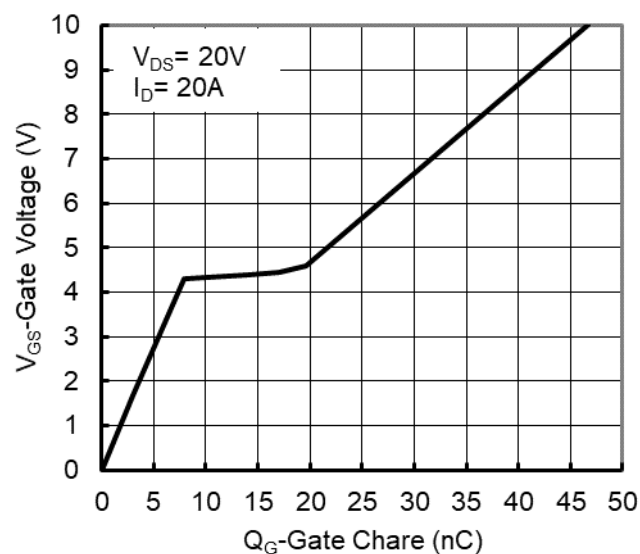


Figure 6. Gate Charge

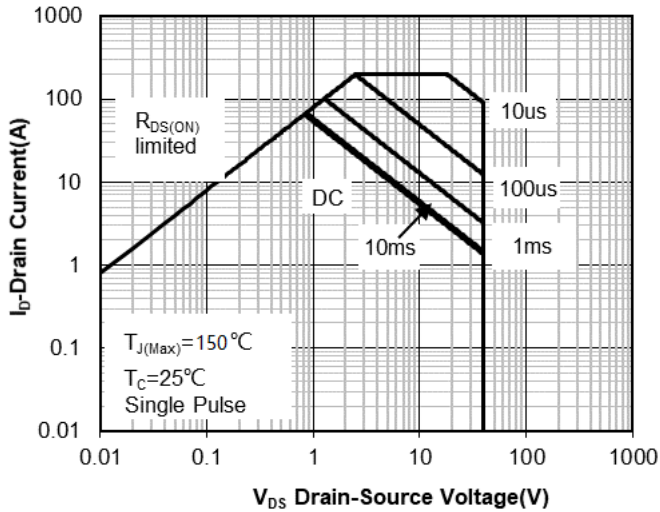


Figure 7. Safe Operation Area

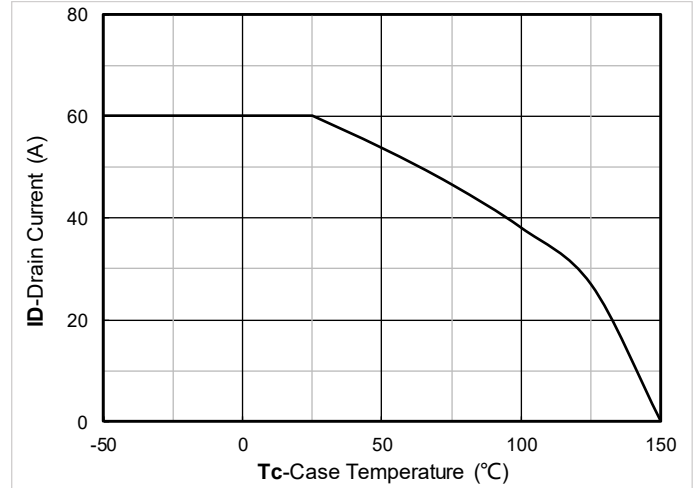


Figure 8. Maximum Continuous Drain Current vs Case Temperature

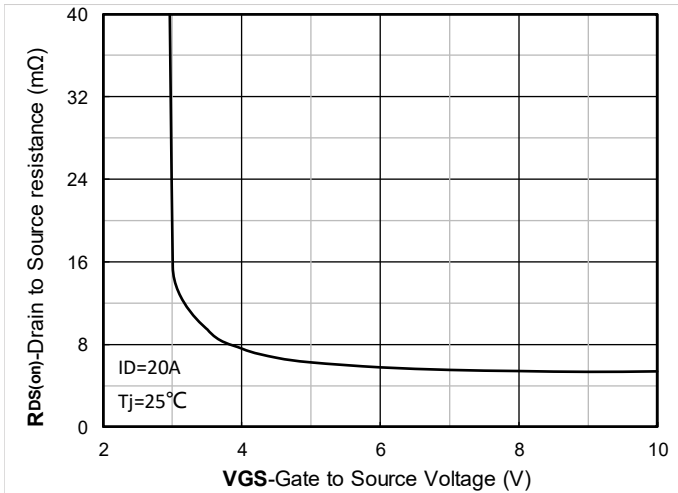


Figure 9. On-Resistance vs Gate to Source Voltage

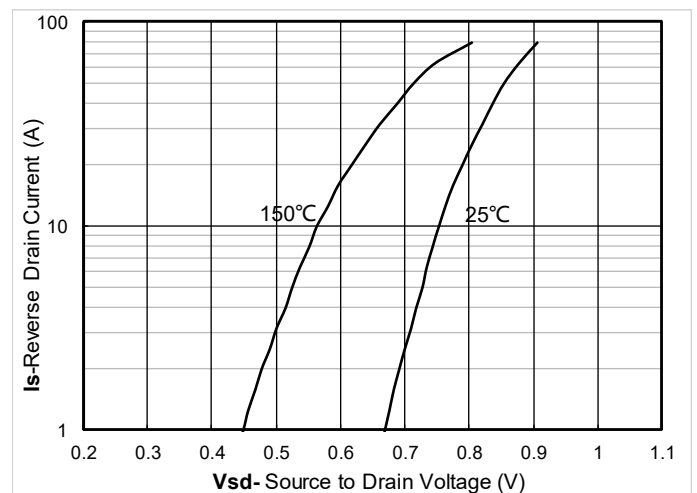


Figure 10. Forward characteristics of reverse diode

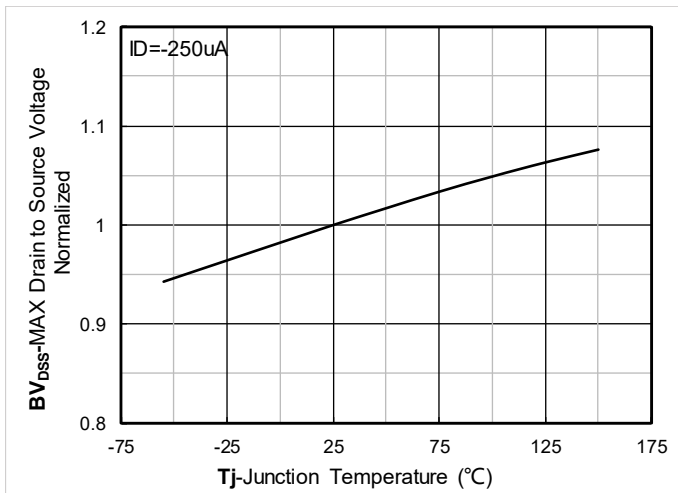


Figure 11. Normalized breakdown voltage

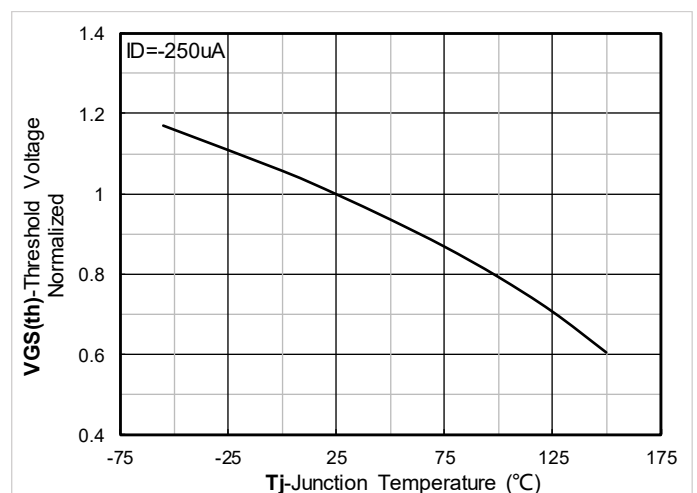


Figure 12. Normalized Threshold voltage

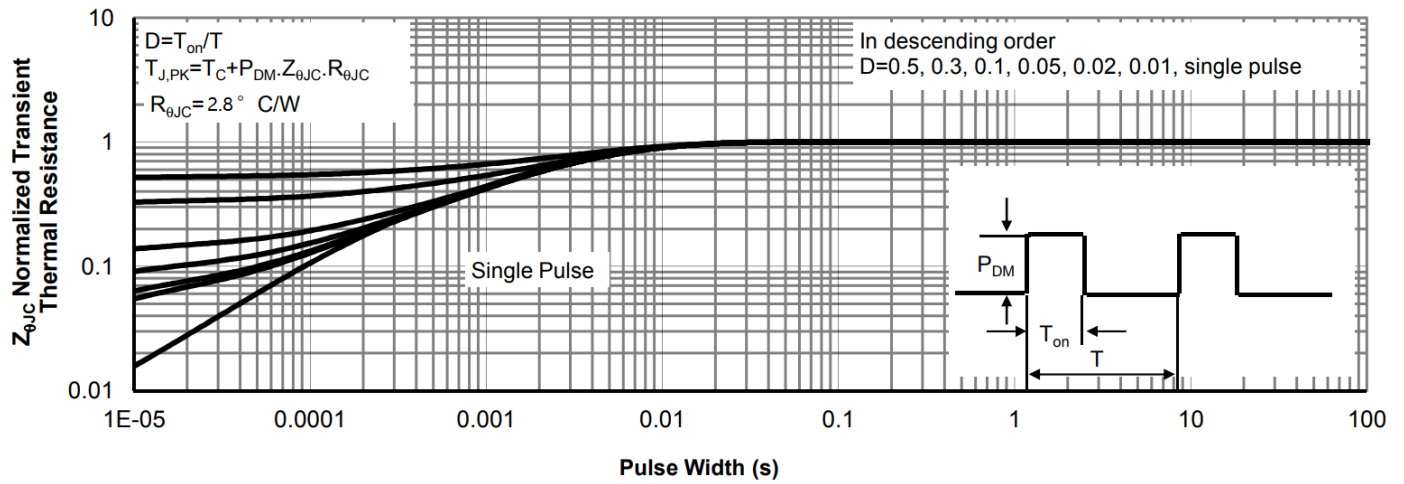
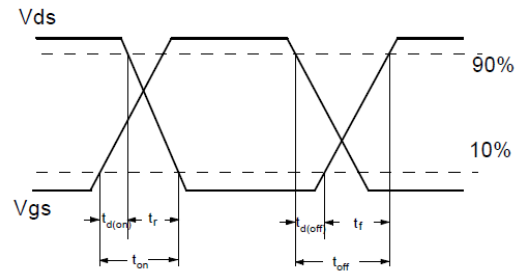
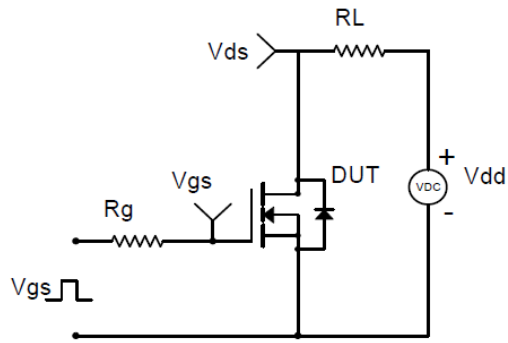
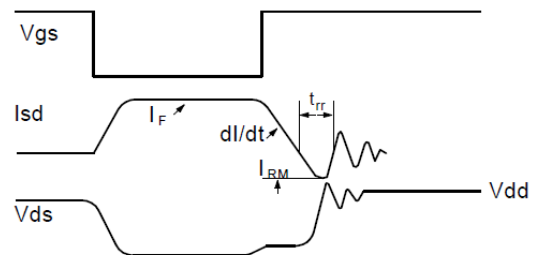
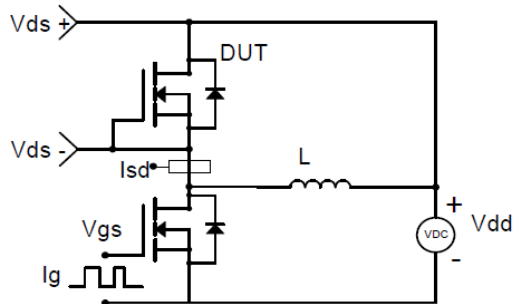


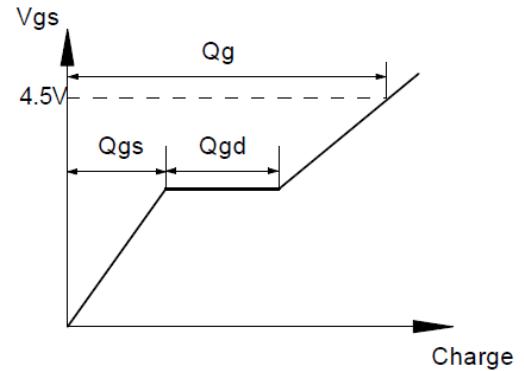
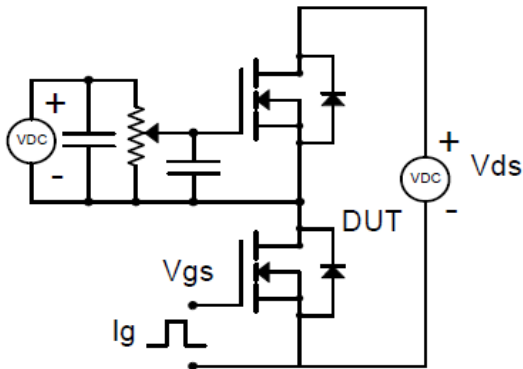
Figure 13. Normalized Maximum Transient Thermal Impedance



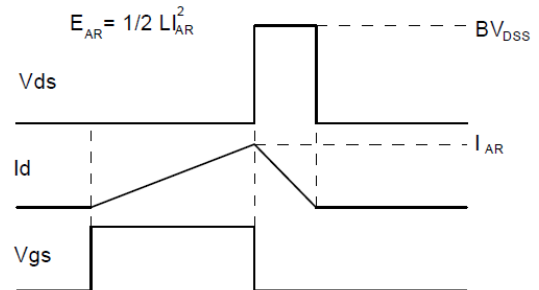
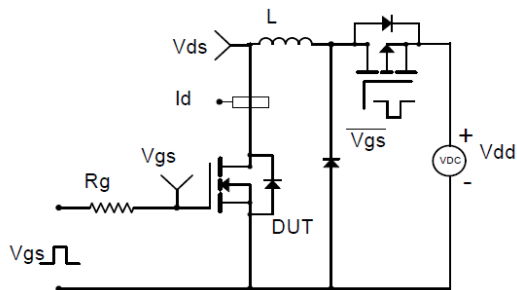
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Gate Charge Test Circuit & Waveform

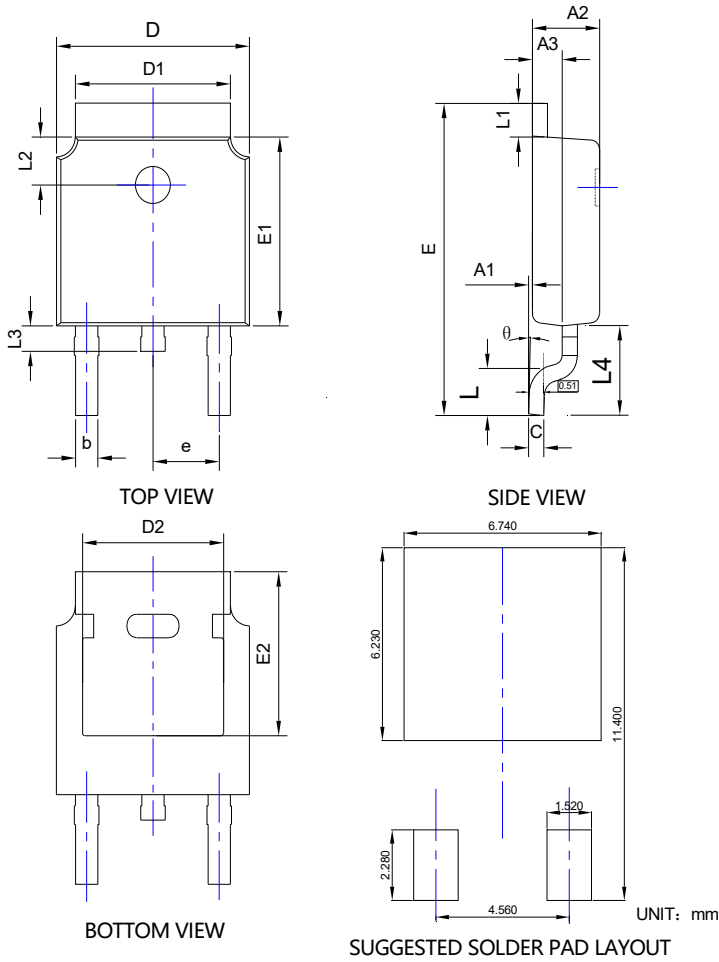


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



YJD60N04A

■ 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		
θ	0°	---	10°	0°	---	10°

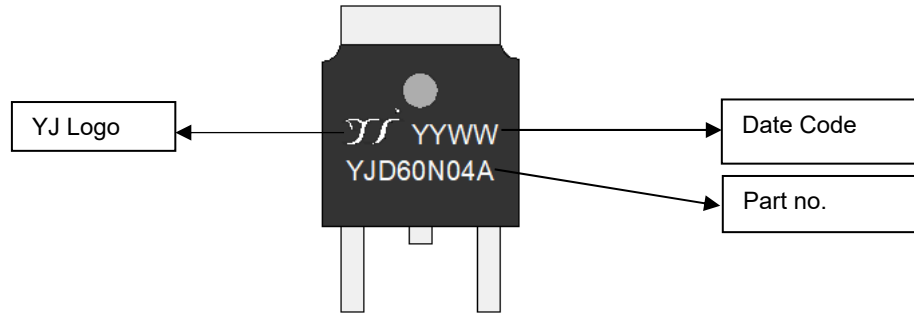
NOTE:

- 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.



YJD60N04A

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJD60N04A is part no., YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



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