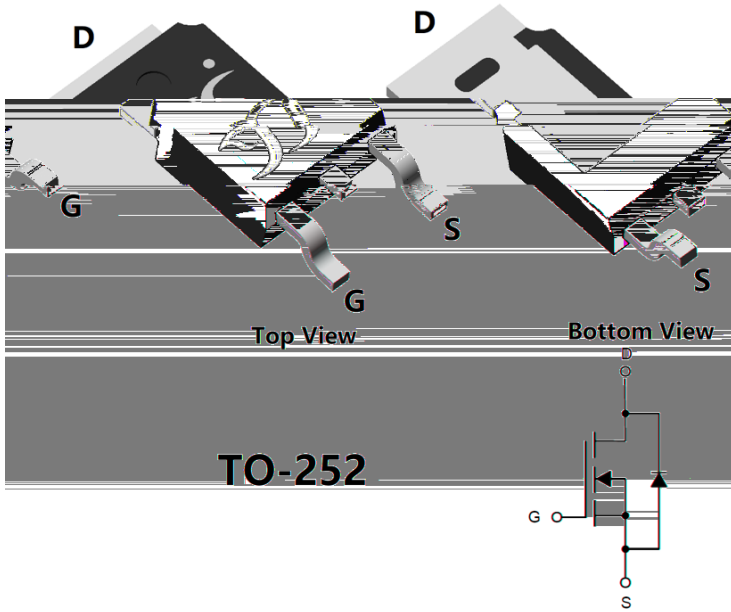


## N-Channel Enhancement Mode Field Effect Transistor



### Product Summary

- $V_{DS}$  30V
- $I_D$  50A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ ) <7.3mohm
- $R_{DS(ON)}$  (at  $V_{GS}=4.5V$ ) <11.5mohm
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### 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 switch
- Hard switched and high frequency circuits
- Uninterruptible power supply

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	30	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_C=25^\circ C$	$I_D$	50	A
	$T_C=100^\circ C$		31	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	150	A
Total Power Dissipation	$T_C=25^\circ C$	$P_D$	28	W
	$T_C=100^\circ C$		11	
Single Pulse Avalanche Energy <sup>B</sup>		$E_{AS}$	53	mJ
Thermal Resistance Junction-to-Case <sup>C</sup>		$R_{\theta JC}$	4.4	$^\circ C/W$
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ C$

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD50N03A	F1/F2	YJD50N03A	2500	/	25000	13" reel



# YJD50N03A

## ■ Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=30V, V_{GS}=0V, T_J=150^\circ\text{C}$			100	
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$		5.4	7.3	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$		9.5	11.5	
Diode Forward Voltage	$V_{SD}$	$I_S=15A, V_{GS}=0V$		0.85	1.2	V
Maximum Body-Diode Continuous Current	$I_S$				50	A
Gate resistance	$R_G$	$f=1\text{MHz}$		4		$\Omega$
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$		1015		pF
Output Capacitance	$C_{oss}$			201		
Reverse Transfer Capacitance	$C_{rss}$			164		
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=20V, I_D=20A$		23.6		nC
Gate-Source Charge	$Q_{gs}$			3.9		
Gate-Drain Charge	$Q_{gd}$			7		
Reverse Recovery Charge	$Q_{rr}$	$I_F=20A, di/dt=100A/\mu s$		0.2		ns
Reverse Recovery Time	$t_{rr}$			5		
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DD}=20V, I_D=2A, R_{GEN}=3\Omega$		7		ns
Turn-on Rise Time	$t_r$			19		
Turn-off Delay Time	$t_{D(off)}$			24		
Turn-off fall Time	$t_f$			24		

A. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

B.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=25V$ ,  $V_G=10V$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=14.5A$

C.  $R_{\theta JA}$  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.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  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

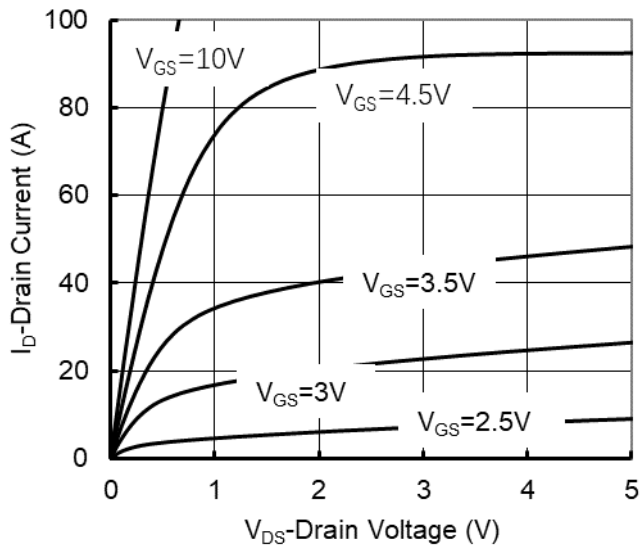


Figure 1. Output Characteristics

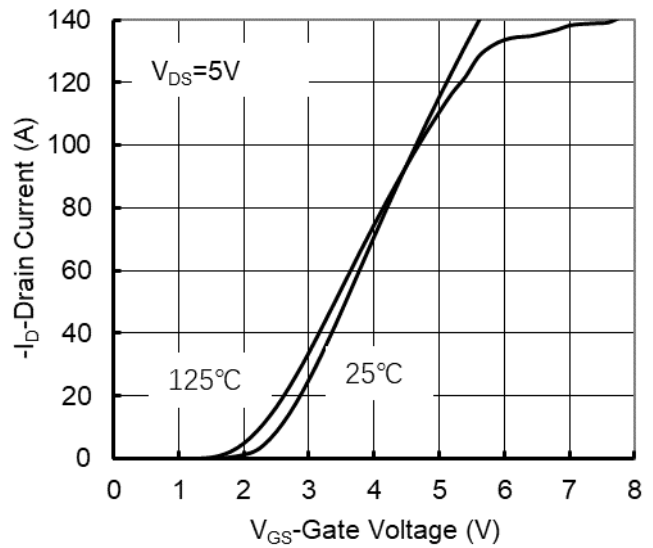


Figure 2. Transfer Characteristics

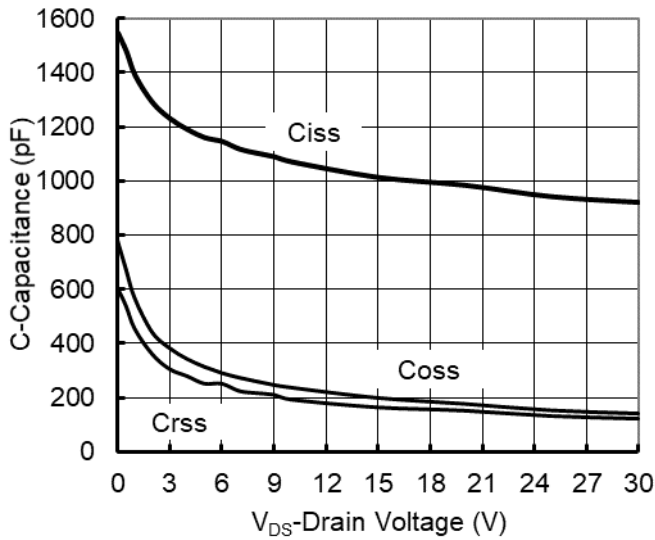


Figure 3. Capacitance Characteristics

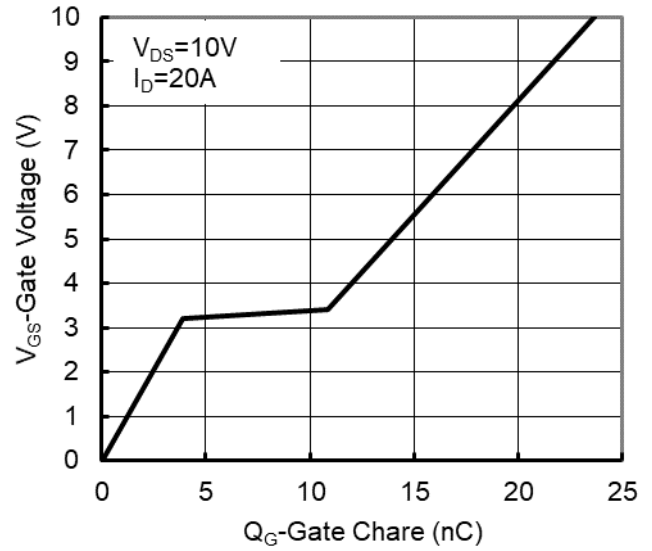


Figure 4. Gate Charge

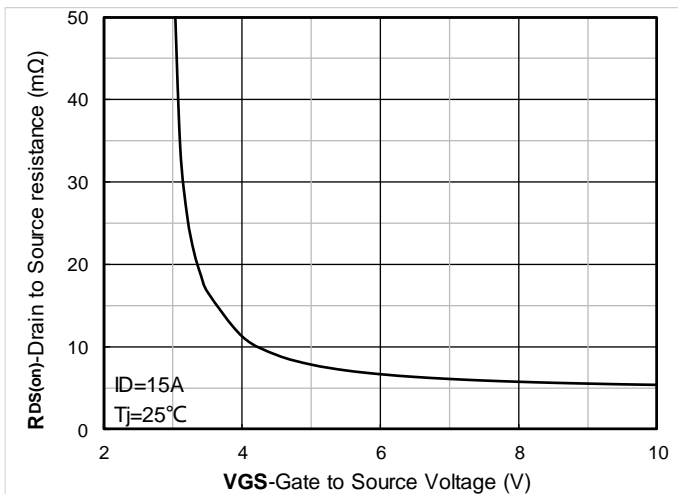


Figure 5. On-Resistance vs Gate to Source Voltage

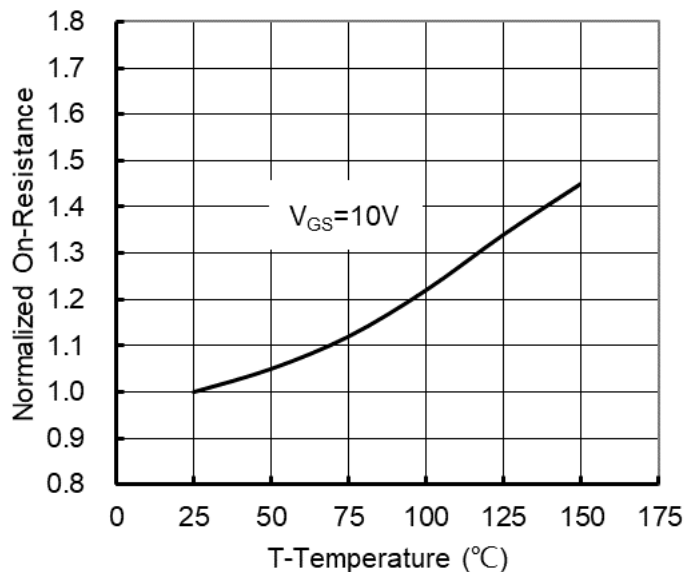


Figure 6. On-Resistance vs. Junction Temperature



# YJD50N03A

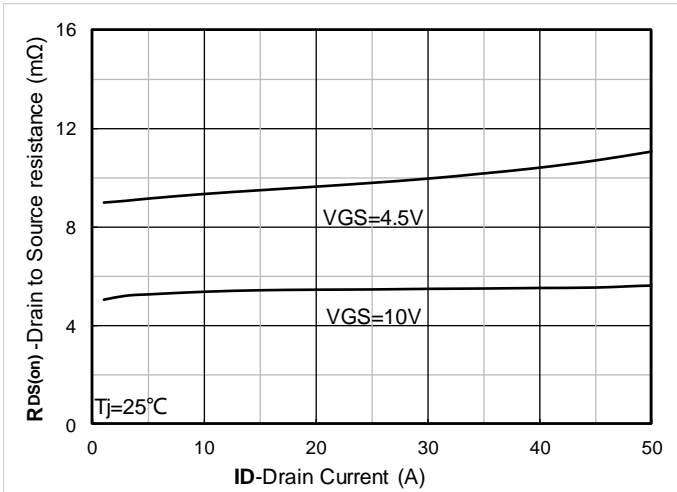


Figure 7.  $R_{DS(on)}$  VS Drain Current

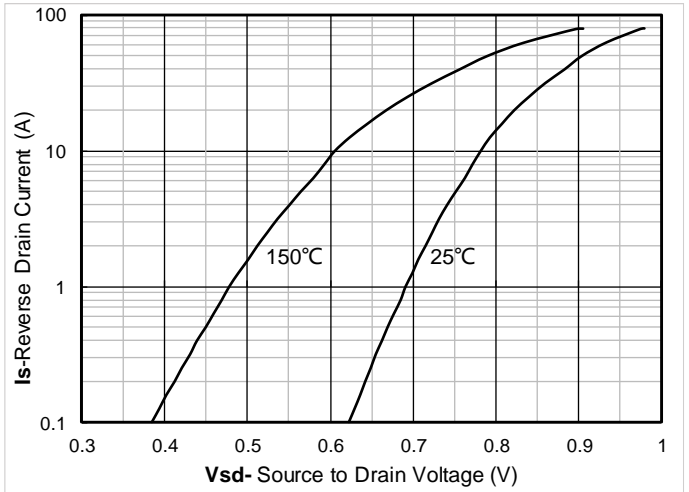


Figure 8. Forward characteristics of reverse diode

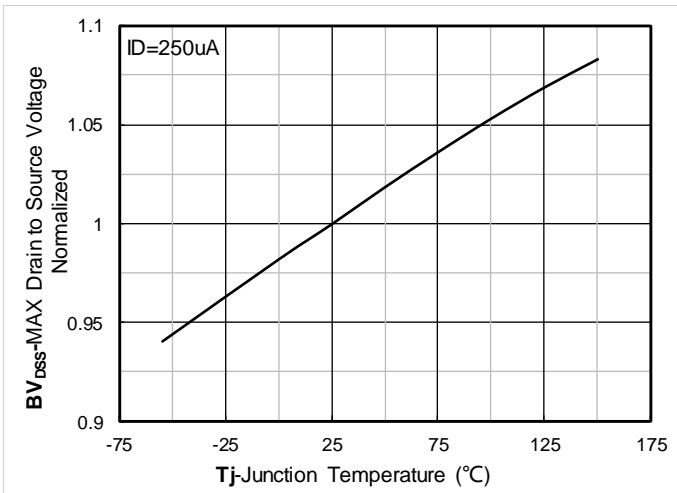


Figure 9. Normalized breakdown voltage

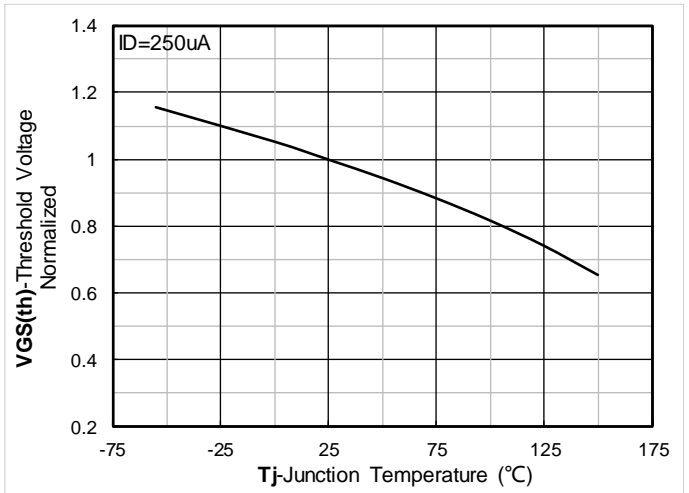


Figure 10. Normalized Threshold voltage

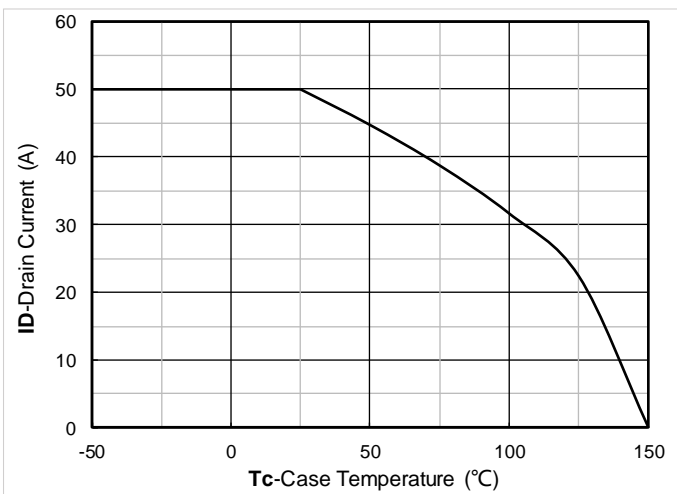


Figure 11. Current dissipation

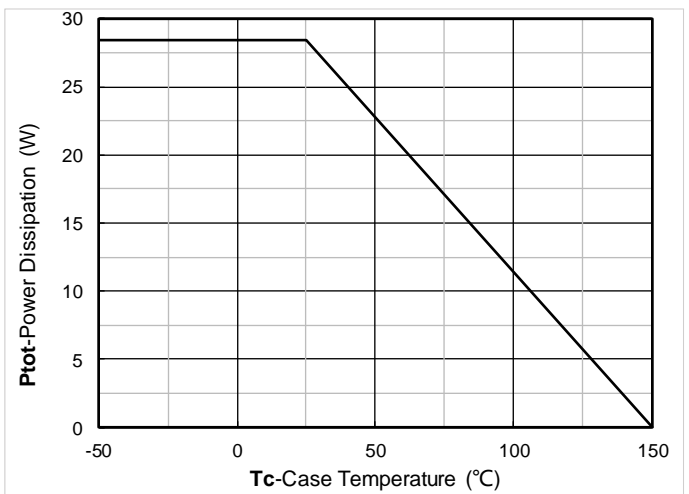


Figure 12. Power dissipation

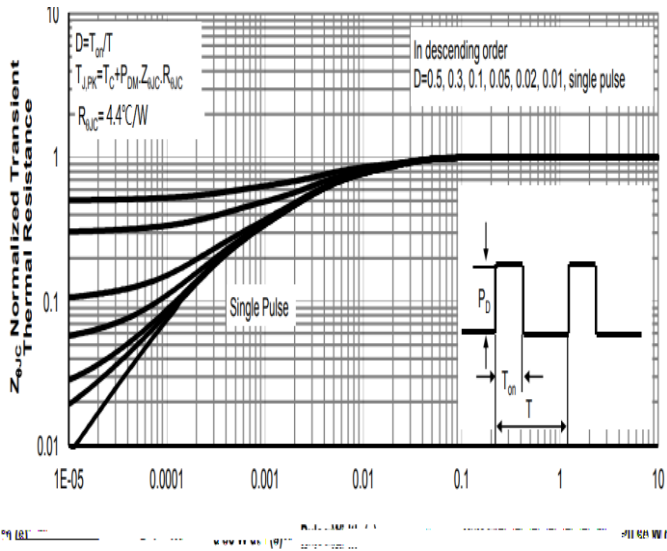


Figure 13. Normalized Maximum Transient Thermal Impedance

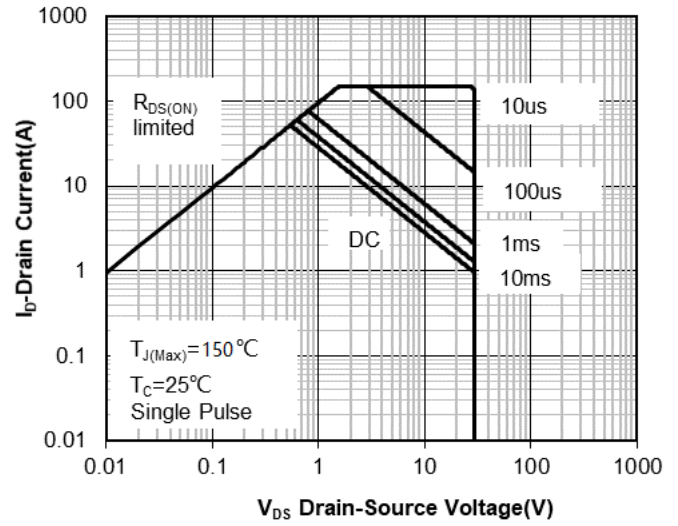
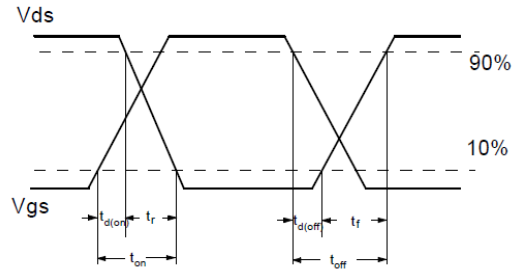
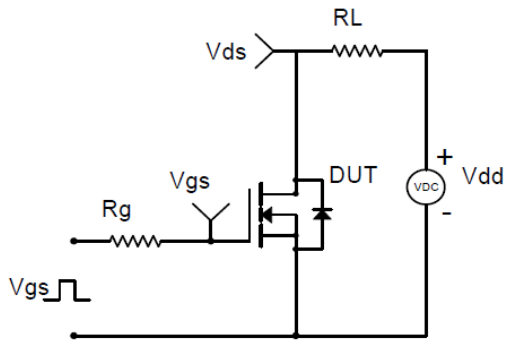
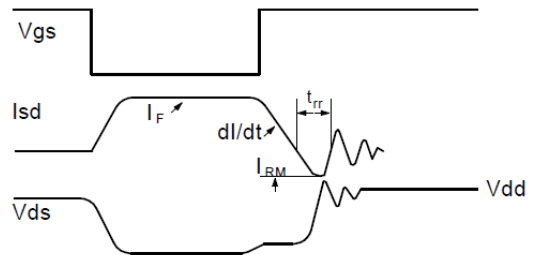
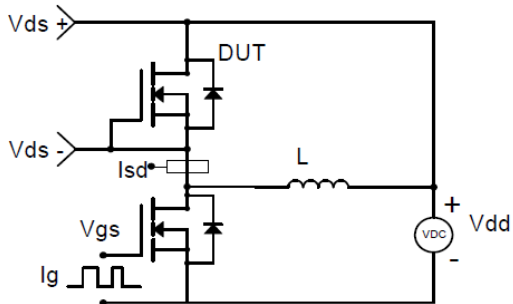


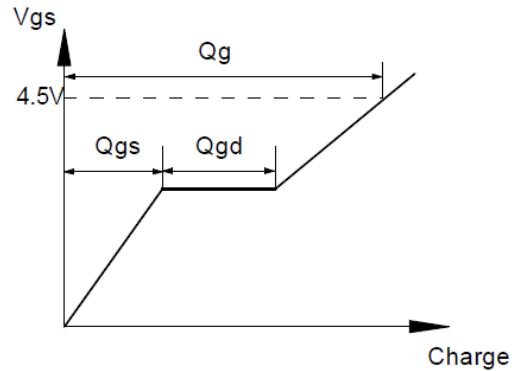
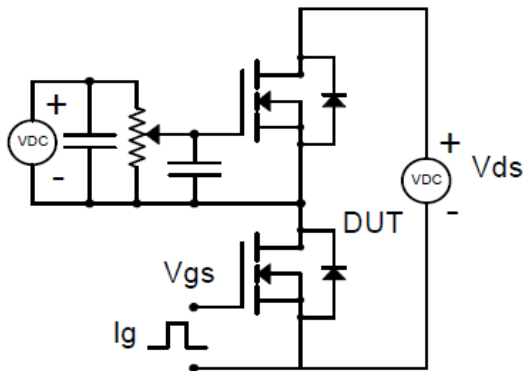
Figure 14. Safe Operation Area



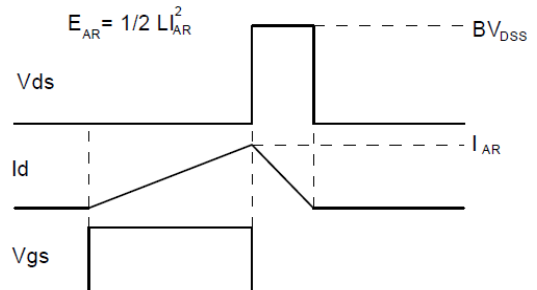
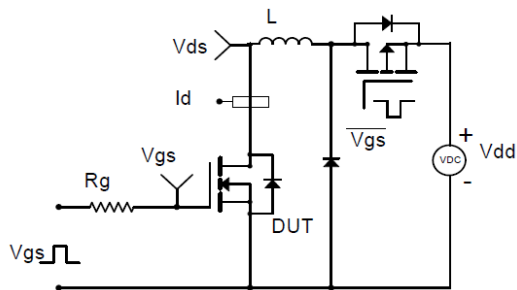
**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



**Gate Charge Test Circuit & Waveform**

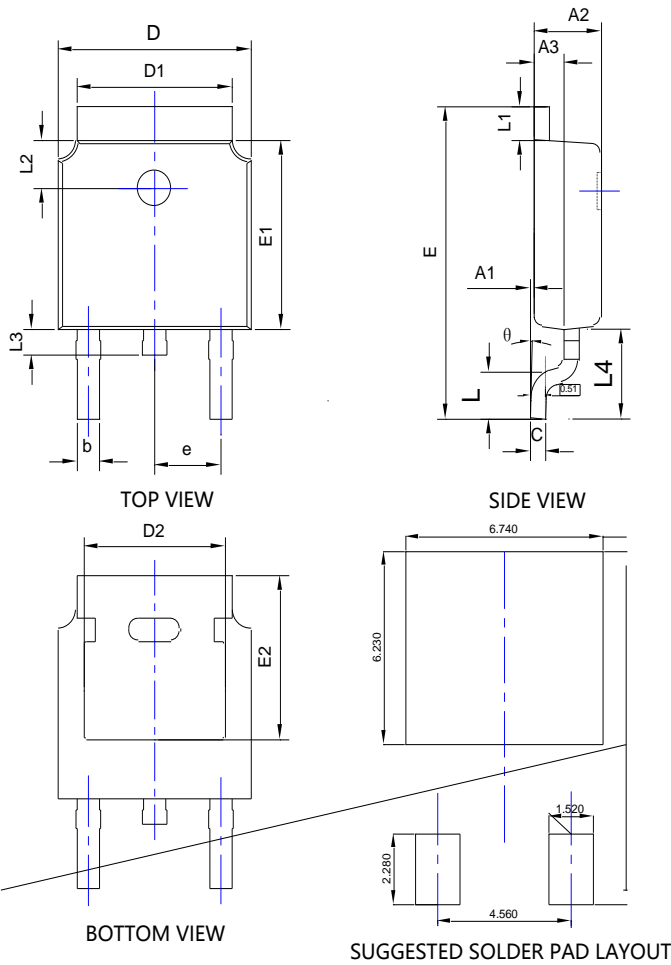


**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



# YJD50N03A

## ■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.



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