

## 700V, 6A, 1251mΩ N-channel Power Planar MOSFET

### JMPK6N70BJ

#### Features

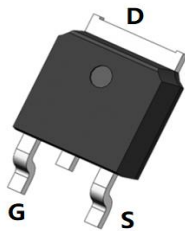
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant

#### Applications

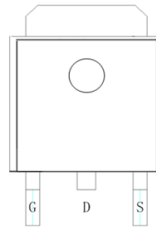
- SMPS with PFC and Flyback
- Silver ATX, adapter, TV, lighting, Telecom

#### Product Summary

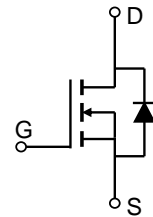
Parameters	Value	Unit
$V_{DSS}$	700	V
$V_{GS(th)}_{Typ}$	3.0	V
$I_D (@V_{GS}=10V)$	6	A
$R_{DS(ON)}_{Typ} (@V_{GS}=10V)$	1251	mΩ



TO-252-3L Top View



Pin Assignment



Schematic Diagram

#### Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMPK6N70BJ	JMPK6N70BJ	3	Tape&Reel	TO-252-3L	2500	25000

#### Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-to-Source Voltage	700	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	157	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	W
		$T_C = 100^\circ\text{C}$	
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

#### Thermal Characteristics

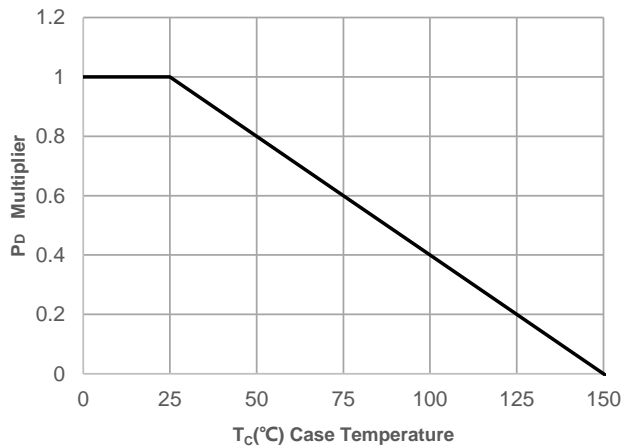
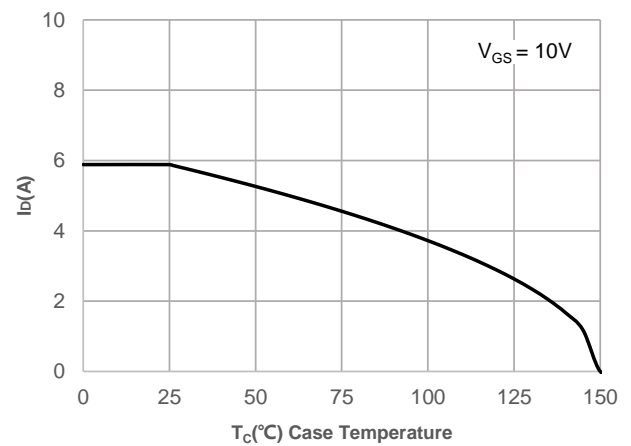
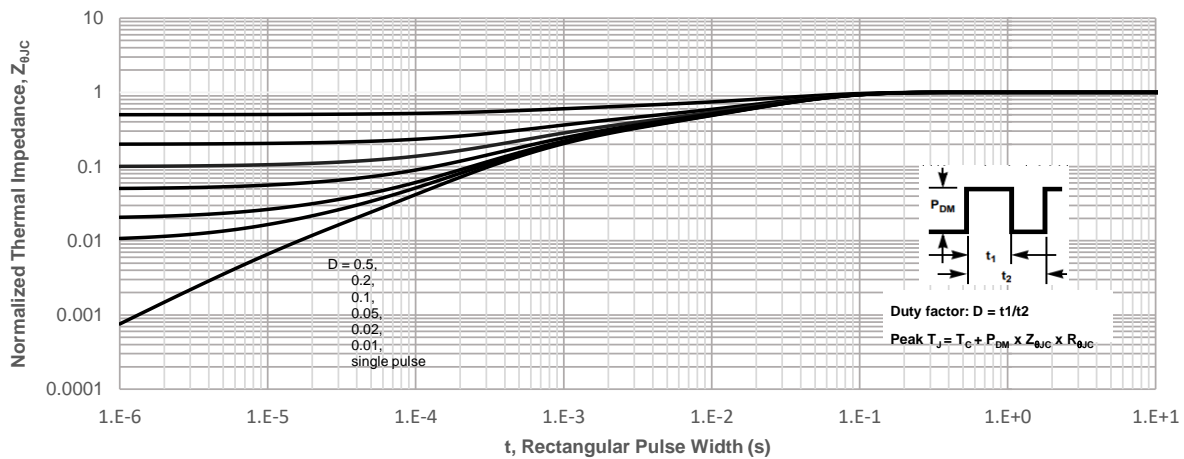
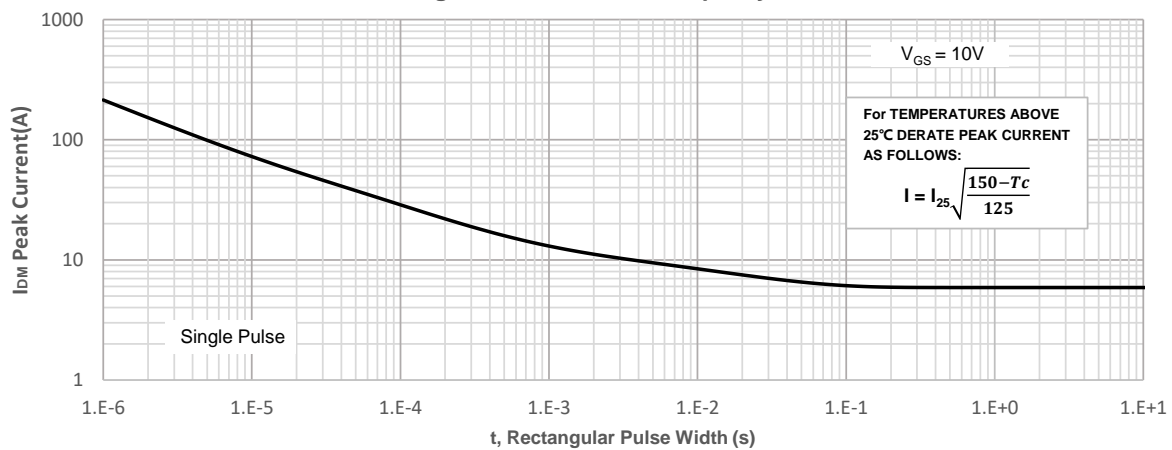
Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	61	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.5	

**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

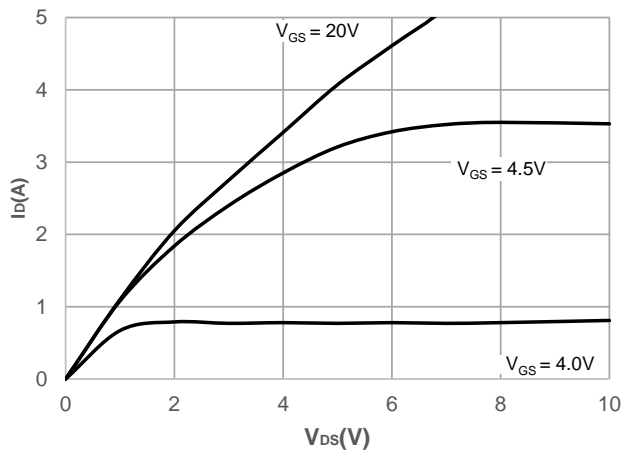
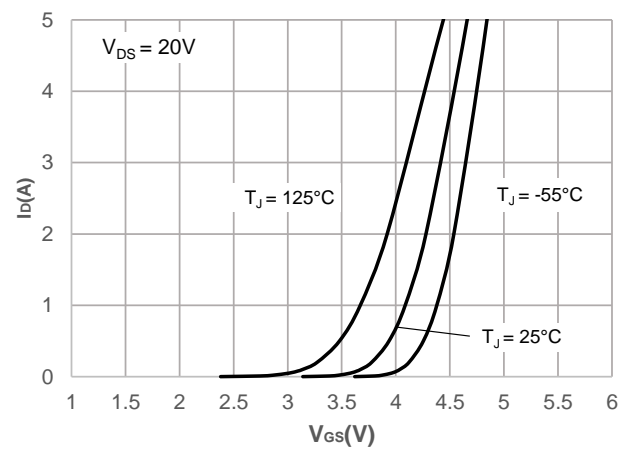
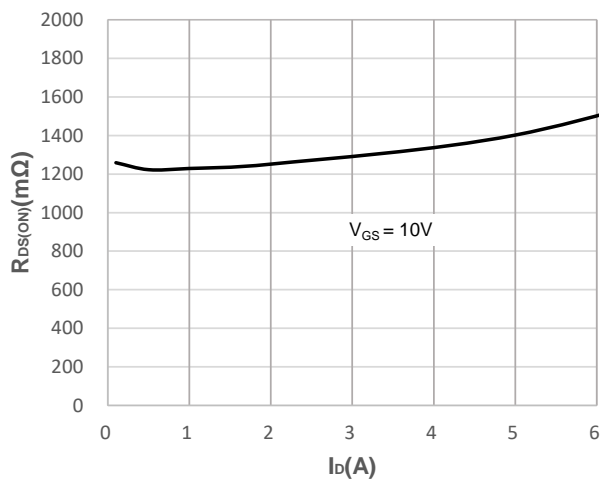
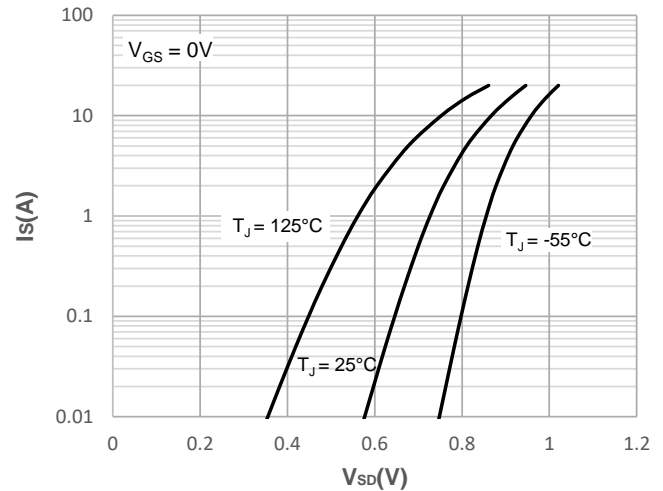
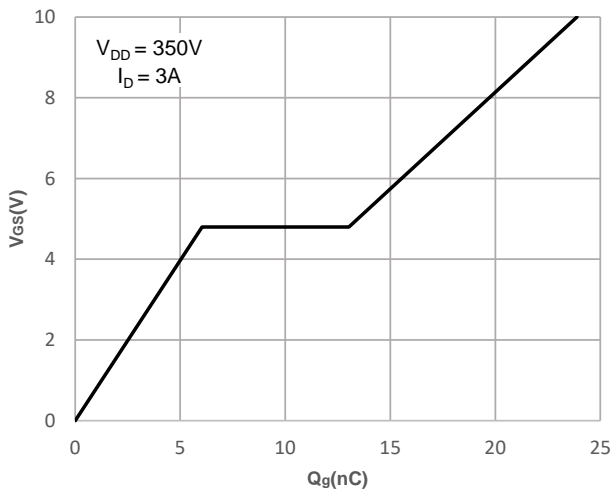
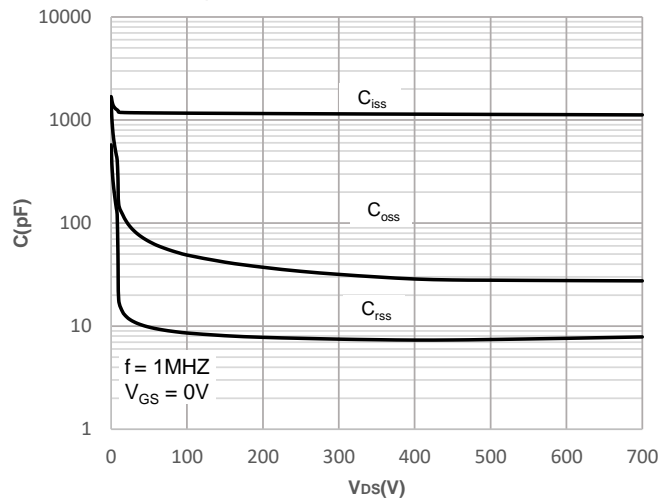
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	700	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 700V, V <sub>GS</sub> = 0V	-	-	1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±30V	-	-	±100	nA
On Characteristics						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.1	3.0	3.9	V
R <sub>DS(ON)</sub>	Static Drain-Source ON-Resistance <sup>(4)</sup>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A	-	1251	1627	mΩ
Dynamic Characteristics						
R <sub>g</sub>	Gate Resistance	f = 1MHz	-	2.3	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 350V, f = 1MHz	-	1144	-	pF
C <sub>oss</sub>	Output Capacitance		-	30	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	7.4	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to 10V V <sub>DS</sub> = 350V, I <sub>D</sub> = 3A	-	24	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	6.0	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	7.0	-	nC
Switching Characteristics						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 350V I <sub>D</sub> = 3A, R <sub>GEN</sub> = 6Ω	-	12	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	16	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	32	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	23	-	ns
Body Diode Characteristics						
I <sub>S</sub>	Maximum Continuous Body Diode Forward Current		-	-	6	A
I <sub>SM</sub>	Maximum Pulsed Body Diode Forward Current		-	-	24	A
V <sub>SD</sub>	Body Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 3A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> = 3A, di/dt = 100A/us	-	261	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	1998	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 50\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $R_G = 25\Omega$ ,  $L = 10\text{mH}$ ,  $I_{AS} = 5.6\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .

## Typical Performance Characteristics

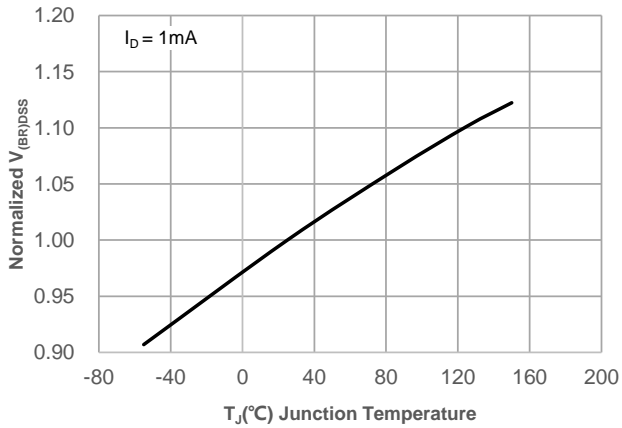
**Figure 1: Power De-rating**

**Figure 2: Current De-rating**

**Figure 3: Normalized Maximum Transient Thermal Impedance**

**Figure 4: Peak Current Capacity**


## Typical Performance Characteristics

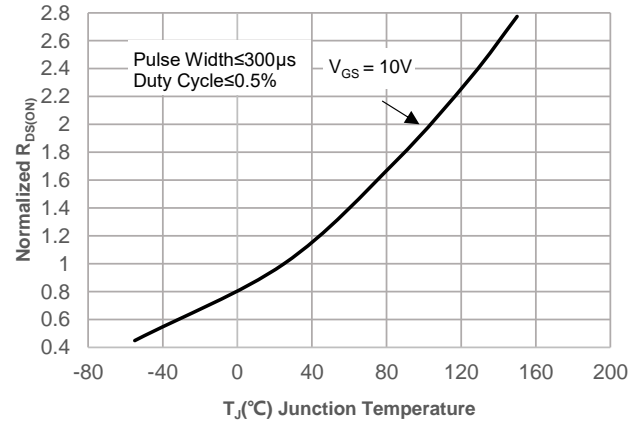
**Figure 5: Output Characteristics**

**Figure 6: Typical Transfer Characteristics**

**Figure 7: On-resistance vs. Drain Current**

**Figure 8: Body Diode Characteristics**

**Figure 9: Gate Charge Characteristics**

**Figure 10: Capacitance Characteristics**


## Typical Performance Characteristics

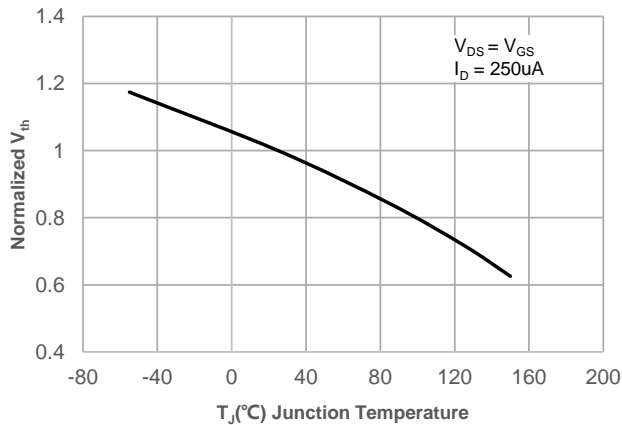
**Figure 11: Normalized Breakdown voltage vs. Junction Temperature**



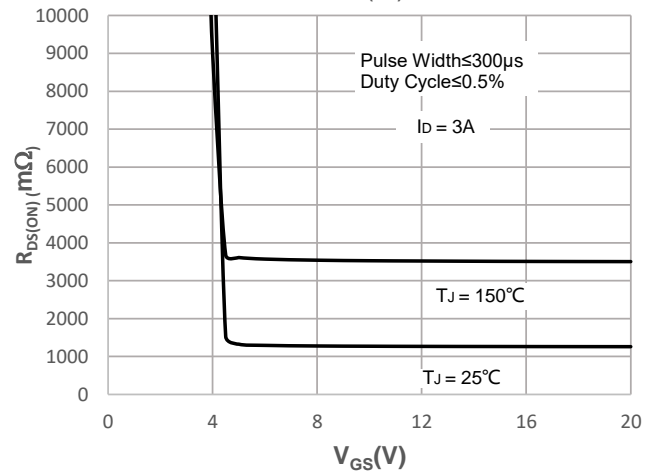
**Figure 12: Normalized on Resistance vs. Junction Temperature**



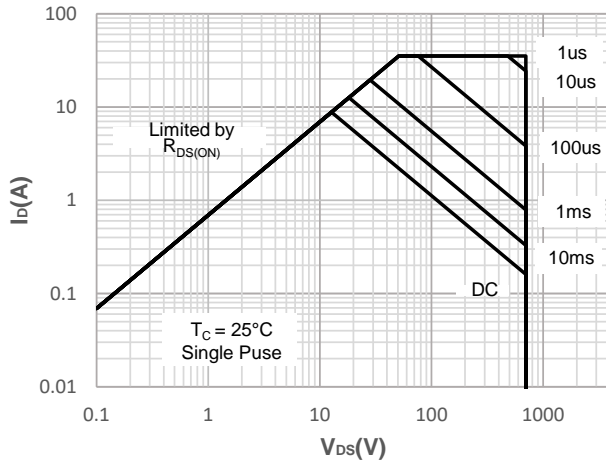
**Figure 13: Normalized Threshold Voltage vs. Junction Temperature**



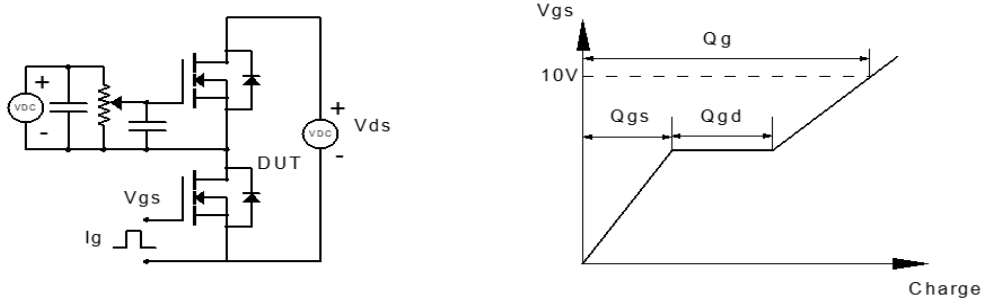
**Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$**



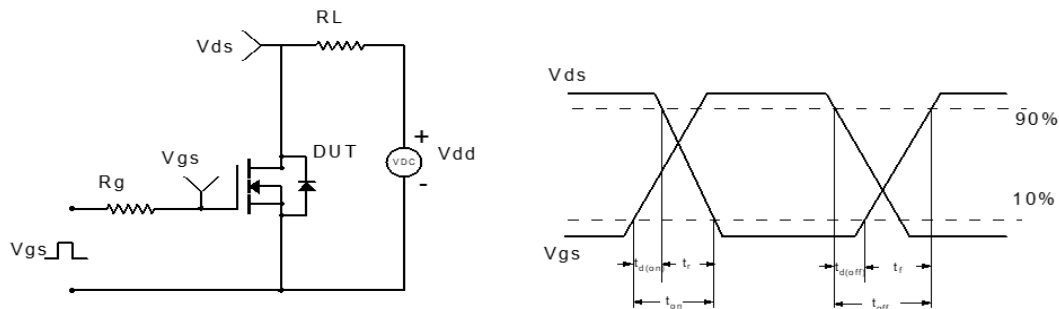
**Figure 15: Maximum Safe Operating Area**



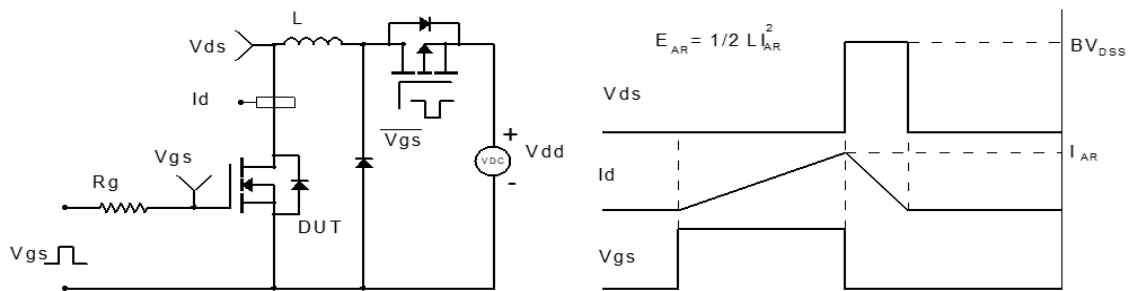
## Test Circuit



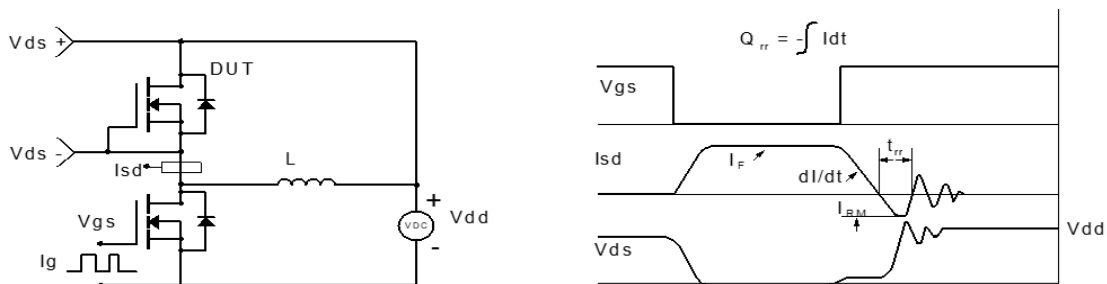
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**

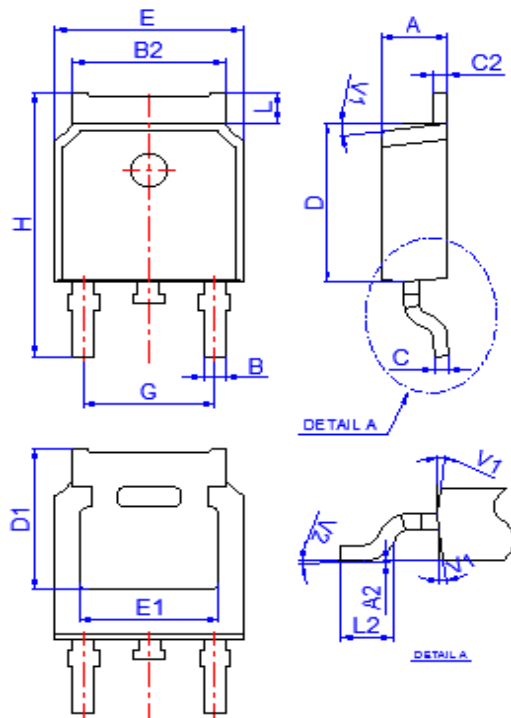


**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



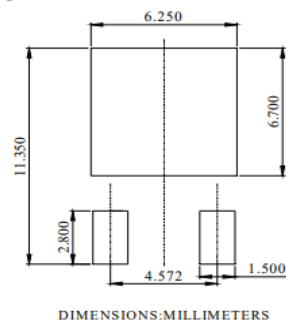
**Figure 4: Diode Recovery Test Circuit & Waveform**

## Package Mechanical Data(TO-252-3L)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.15	0		0.006
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

### Recommended Soldering Footprint



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