

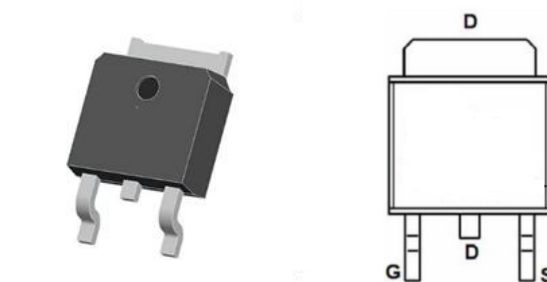
## Description

This Power MOSFET is produced using advanced TRENCH technology.

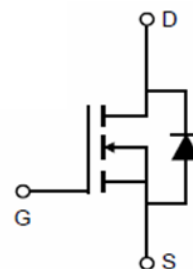
This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

## Features

- $V_{DS}=20V$  ,  $I_D=60A$
- $R_{DS(ON) TYP}=5m\Omega @ V_{GS}=4.5V$
- $R_{DS(ON) TYP}=7.1m\Omega @ V_{GS}=2.5V$
- Very Low On-resistance  $R_{DS(ON)}$
- Low  $C_{rss}$
- Fast switching
- 100% avalanche tested
- Improved  $dv/dt$  capability



TO-252-2L top view



Schematic diagram

## Applications

- PWM Application
- Load Switch
- Power Management

### Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-source Voltage		$V_{DS}$	20	V
Gate-source Voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	$I_D$	60	A
	$T_C=100^\circ\text{C}$		39	
Pulsed Drain Current( $T_C=25^\circ\text{C}$ , $T_p$ Limited By $T_{jmax}$ ) <sup>(note1)</sup>		$I_{DM}$	240	A
Maximum Power Dissipation( $T_C=25^\circ\text{C}$ )		$P_D$	40	W
Avalanche energy , single Pulse( $L=0.5\text{mH}$ ) <sup>(note2)</sup>		$E_{AS}$	90	mJ
Operating Junction And Storage Temperature		$T_j, T_{stg}$	-55 To 150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		$T_L$	300	$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Max	Unit
Junction-to-Case	$R_{\theta JC}$	3.125	$^\circ\text{C}/\text{W}$

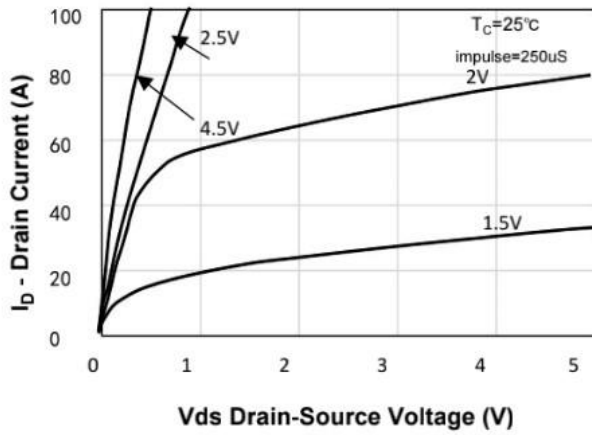
Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition:  $T_j = 25^\circ\text{C}$ ,  $V_{DD} = 10\text{V}$ ,  $V_G = 10\text{V}$ ,  $R_G = 25\Omega$ ,  $L = 0.5\text{mH}$
3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$

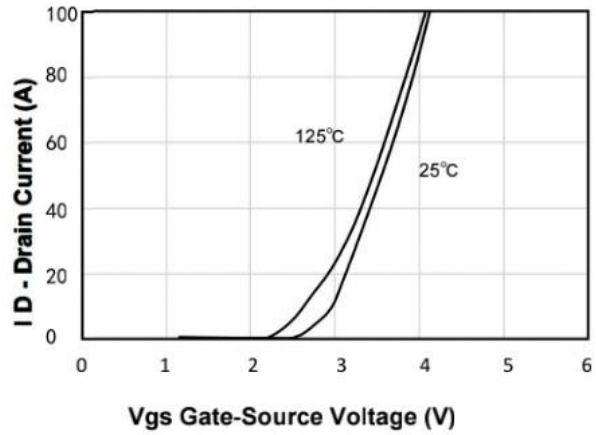
**Electrical Characteristic (TC=25°C unless otherwise noted)**

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
<b>Off Characteristic</b>						
Drain-source breakdown voltage	$BV_{DSS}$	20	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=20V, V_{GS}=0V$
Gate-source leakage current	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 12V, V_{DS}=0V$
<b>On Characteristics</b>						
Gate threshold voltage	$V_{GS(th)}$	0.4	0.7	1.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Drain-source on-state resistance	$R_{DS(on)}$	-	5	6.8	m $\Omega$	$V_{GS}=4.5V, I_D=30A$
		-	7.1	9.8	m $\Omega$	$V_{GS}=2.5V, I_D=30A$
<b>Dynamic Characteristic</b>						
Input Capacitance	$C_{iss}$	-	1625	-	PF	$V_{GS}=0V, V_{DS}=10V, f=1.0MHz$
Output Capacitance	$C_{oss}$	-	280	-		
Reverse Transfer Capacitance	$C_{rss}$	-	269	-		
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	-	17	-	nS	$V_{GS}=4.5V, V_{DS}=10V, I_D=30A, R_G=3\Omega$
Turn-on Rise time	$t_r$	-	50	-		
Turn-off delay time	$t_{d(off)}$	-	75	-		
Turn-off Fall time	$t_f$	-	25	-		
Gate Total Charge	$Q_G$	-	43.7	-	nC	$V_{GS}=10V, V_{DS}=10V, I_D=60A$
Gate-Source Charge	$Q_{gs}$	-	2.7	-		
Gate-Drain Charge	$Q_{gd}$	-	10.9	-		
<b>Drain-Source Diode Characteristics</b>						
Body Diode Forward Voltage	$V_{SD}$	-	0.9	1.2	V	$V_{GS}=0V, I_{SD}=10A$
Body Diode Forward Current	$I_S$	-	-	60	A	-

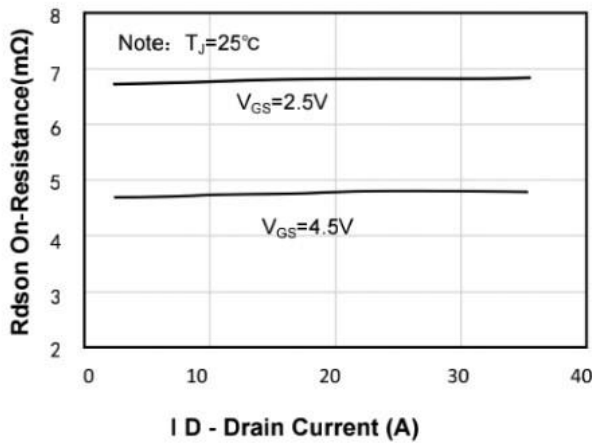
**N- Channel Typical Characteristics**



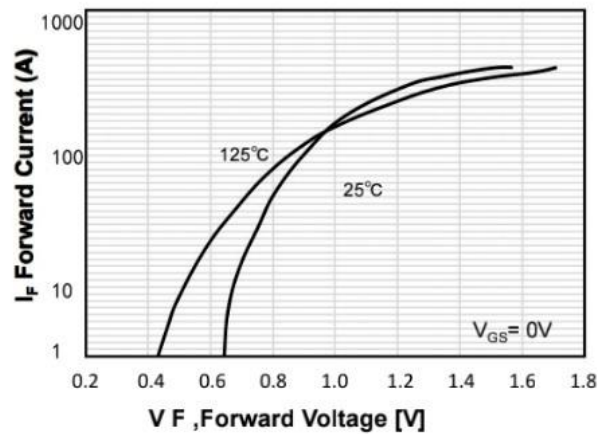
**Figure 1. On-Region Characteristics**



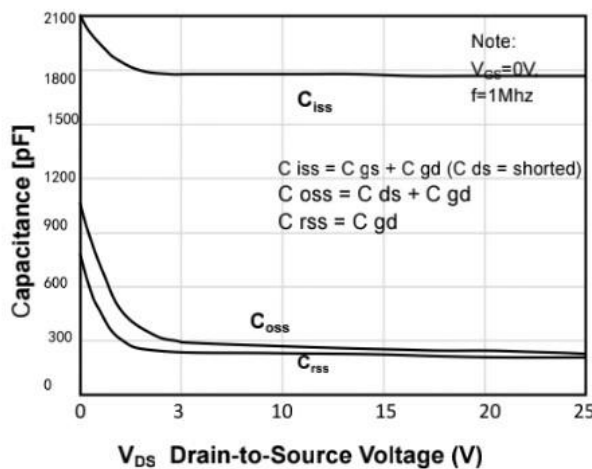
**Figure 2. Transfer Characteristics**



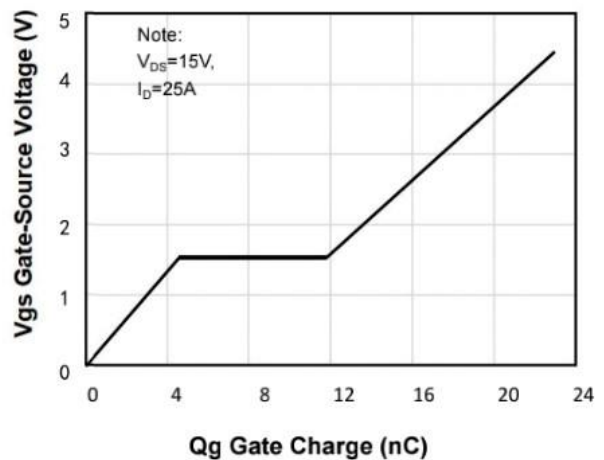
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**

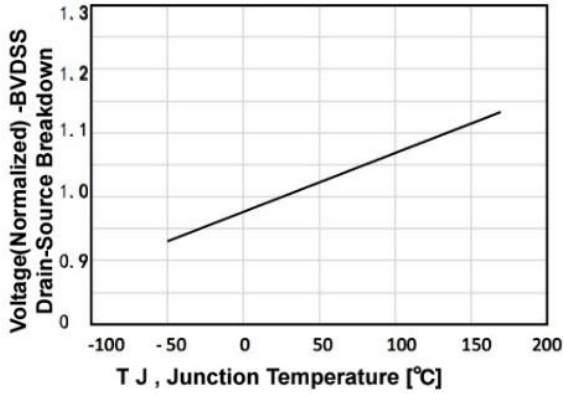


**Figure 5. Capacitance Characteristics**

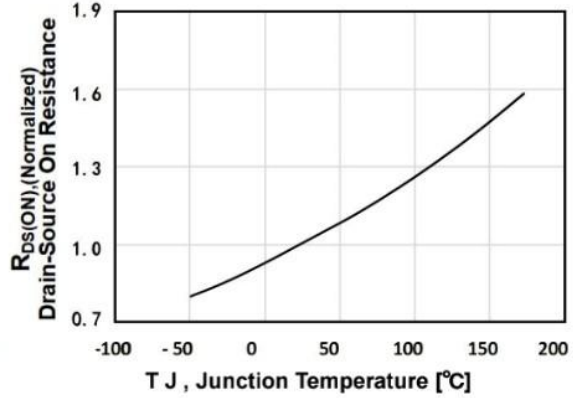


**Figure 6. Gate Charge Characteristics**

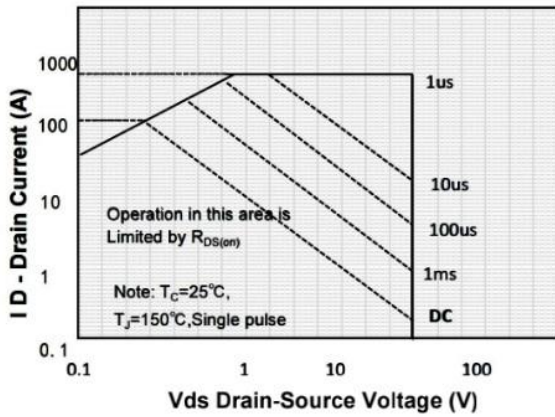
**N- Channel Typical Characteristics** (Continued)



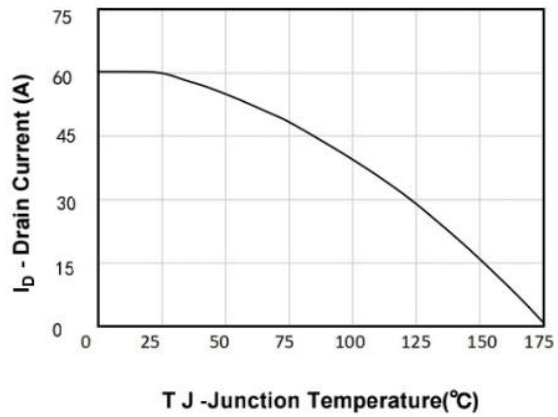
**Figure 7. Breakdown Voltage Variation vs Temperature**



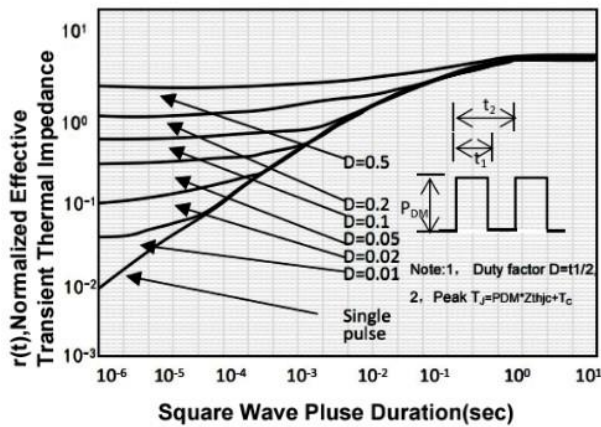
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9. Maximum Safe Operating Area**

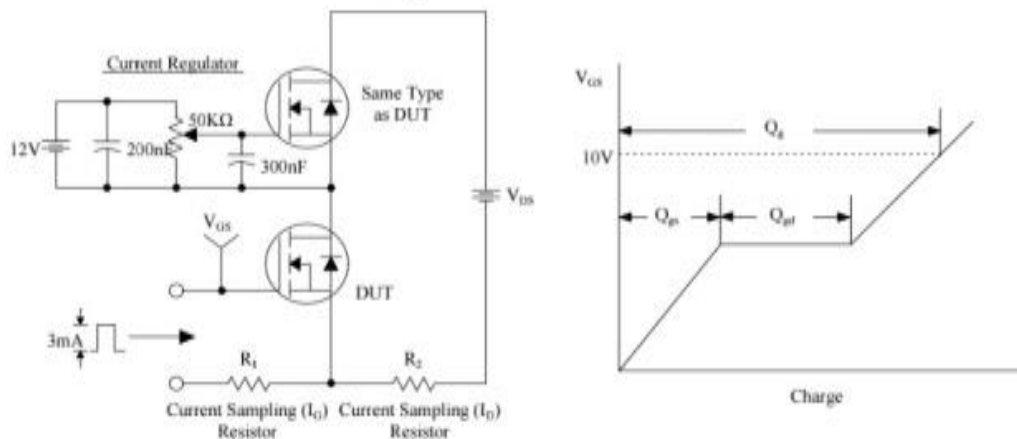


**Figure 10. Maximum PContinuous Drain Current vs Case Temperature**

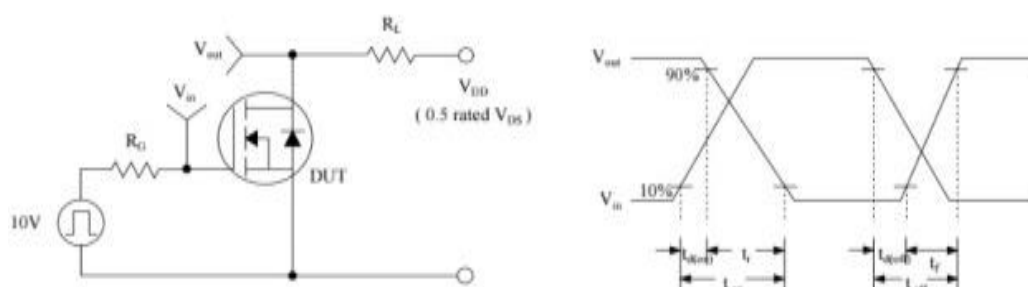


**Figure 11. Transient Thermal Response Curve**

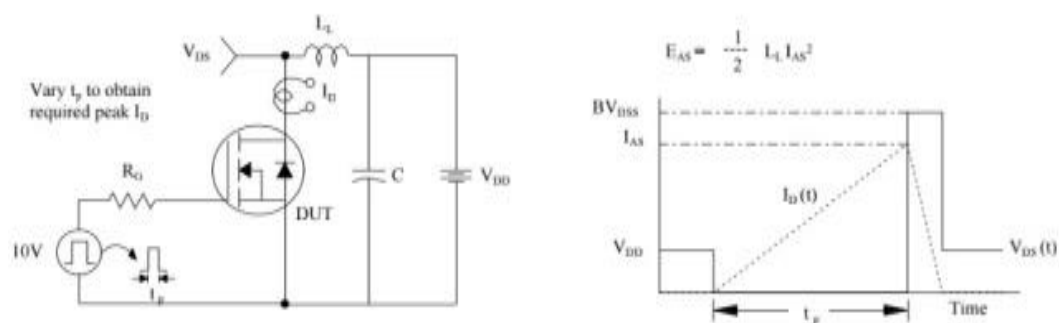
**Gate Charge Test Circuit & Waveform**



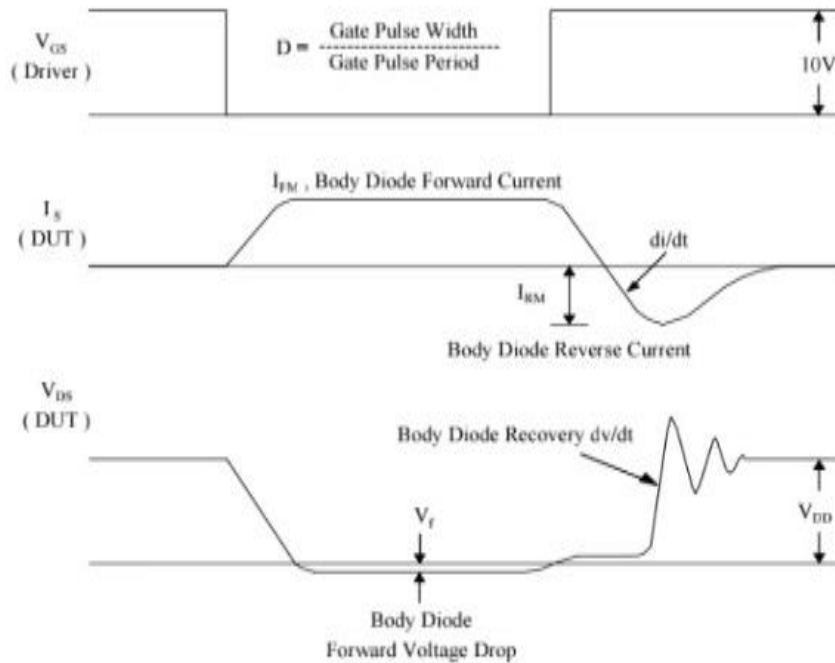
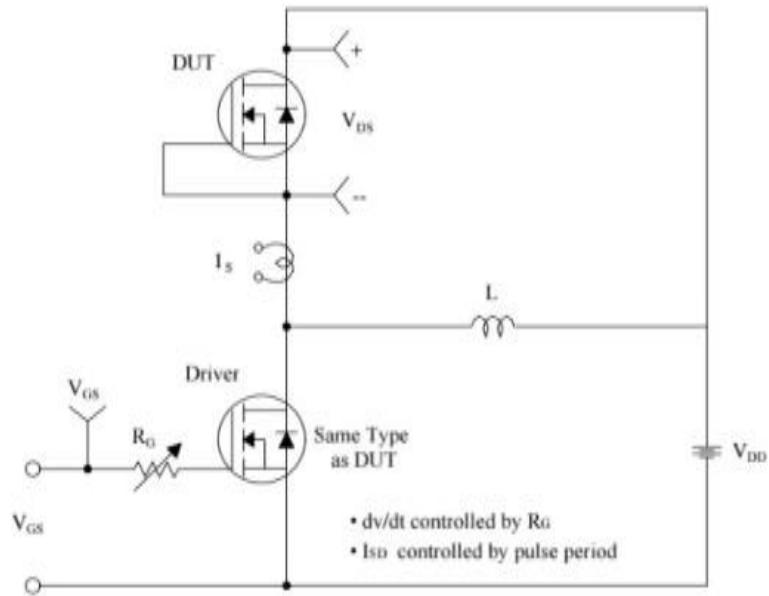
**Resistive Switching Test Circuit & Waveforms**

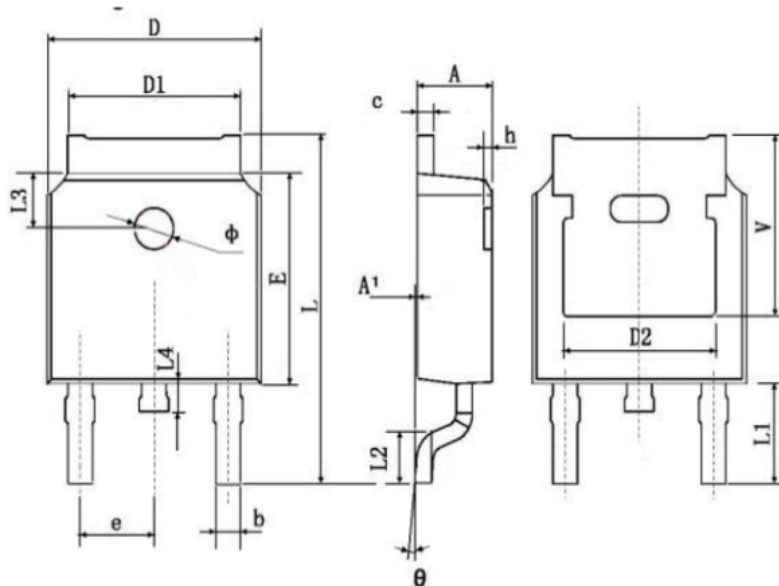


**Unclamped Inductive Switching Test Circuit & Waveforms**



**Peak Diode Recovery dv/dt Test Circuit & Waveforms**



**Package Information**
**TO-252 DPAK**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
phi	1.150	1.250	0.045	0.049
theta	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	