



## Description

The 45P03 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



TO-252-2L

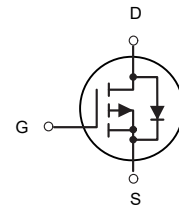
## General Features

$V_{DS} = -30V$   $I_D = 45A$

$R_{DS(ON)} < 12m\Omega$  @  $V_{GS}=10V$

## Application

Battery protection  
Load switch  
Uninterruptible power supply



P-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
45P03	TO-252-2L	45P03 XXX YYYY	2500

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 25$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ -10V	-45	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ -10V	-33	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-200	A
EAS	Single Pulse Avalanche Energy	225	mJ
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	62.5	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	2.8	$^\circ\text{C/W}$



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 uA	-30	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V	--	--	-1	uA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 20V, V <sub>DS</sub> = 0 V	--	--	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -20V, V <sub>DS</sub> = 0 V	--	--	-100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 uA	-1.0	-1.5	-2.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -12A	--	9.3	12	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -7A	-	12.5	17	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	1770	-	pF
C <sub>oss</sub>	Output Capacitance		--	231	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	216	-	pF
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> = -10 V, V <sub>DS</sub> = -15V, R <sub>G</sub> = 3 Ω, I <sub>D</sub> = -25A	--	13	--	ns
t <sub>r</sub>	Turn-On Rise Time		--	8.5	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	26	--	ns
t <sub>f</sub>	Turn-Off Fall Time		--	12	--	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -25A, V <sub>GS</sub> = -10V	--	32	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	6	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	10	--	nC
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	-50	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-200	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage, V <sub>GS</sub> = 0V, I <sub>SD</sub> = -10A, T <sub>J</sub> = 25°C		--	--	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time T <sub>J</sub> = 25°C, I <sub>F</sub> = -25A, di/dt = 100A/μs		--	32	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge T <sub>J</sub> = 25°C, I <sub>F</sub> = -25A, di/dt = 100A/μs		--	21	-	nC

**Notes:**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T<sub>J</sub> = 25°C, V<sub>DD</sub> = -20V, V<sub>G</sub> = -10V, L = 0.5mH.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%



### Typical Characteristics

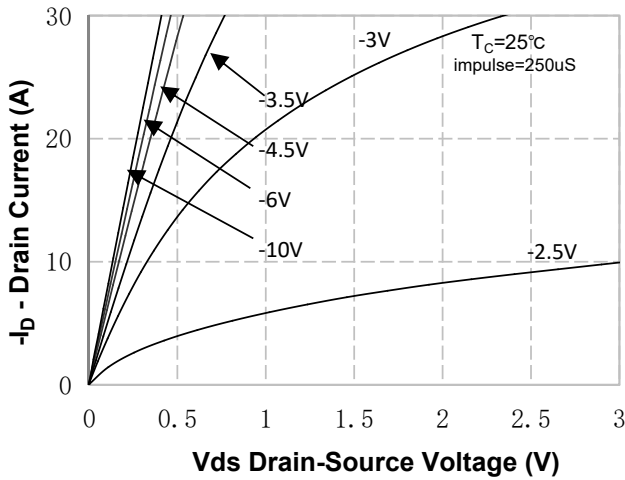


Figure 1. On-Region Characteristics

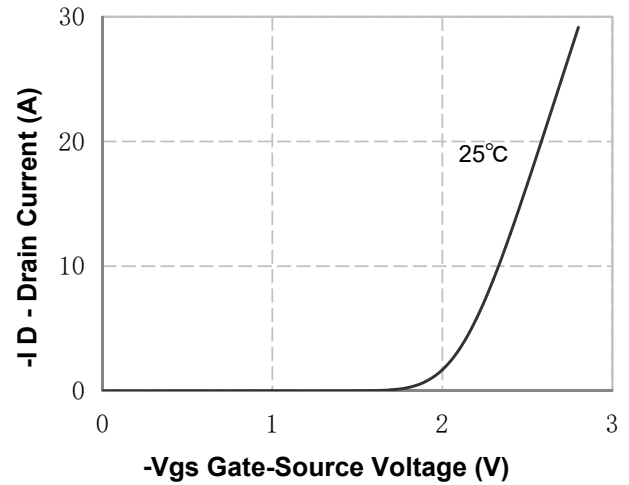


Figure 2. Transfer Characteristics

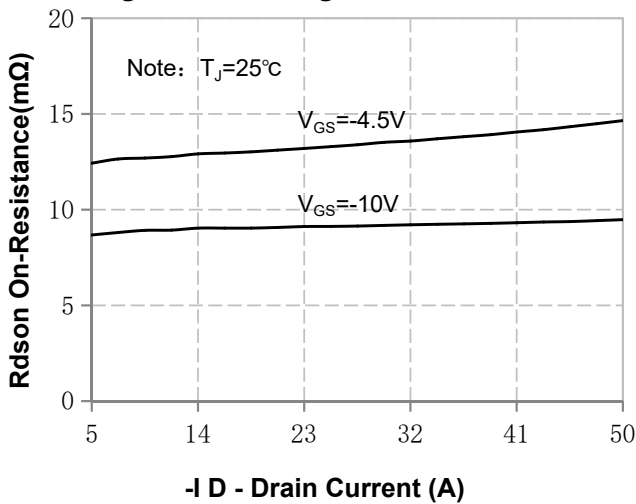


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

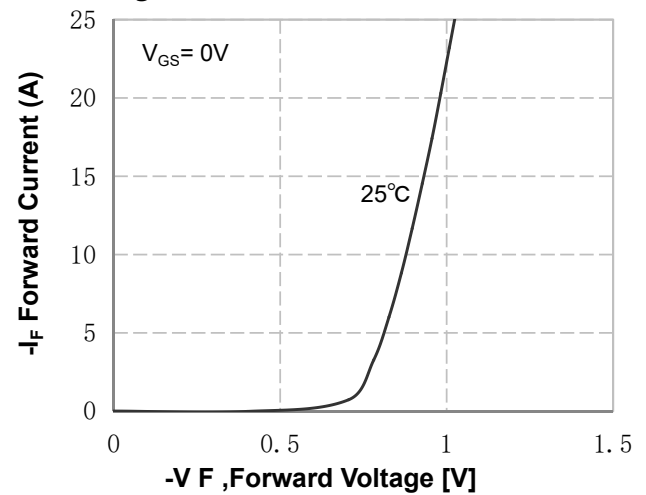


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

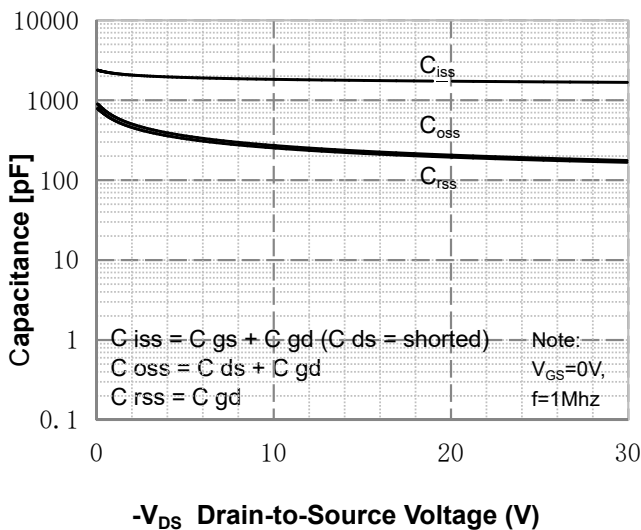


Figure 5. Capacitance Characteristics

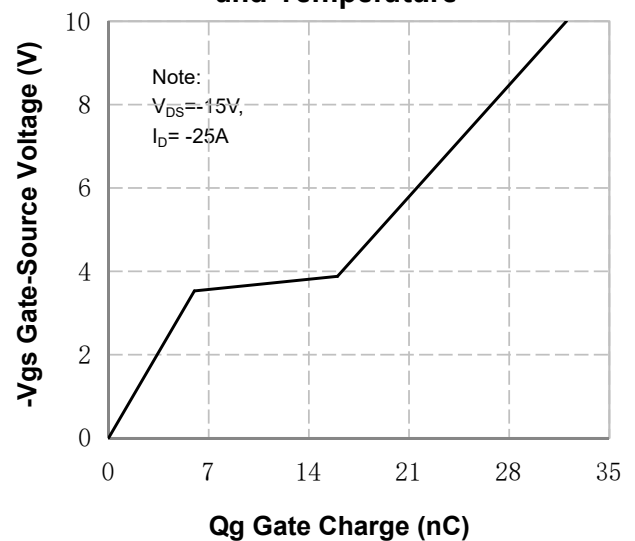


Figure 6. Gate Charge Characteristics

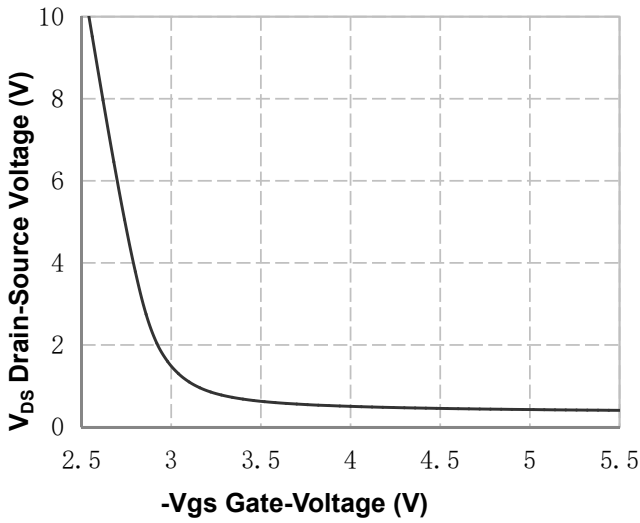


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

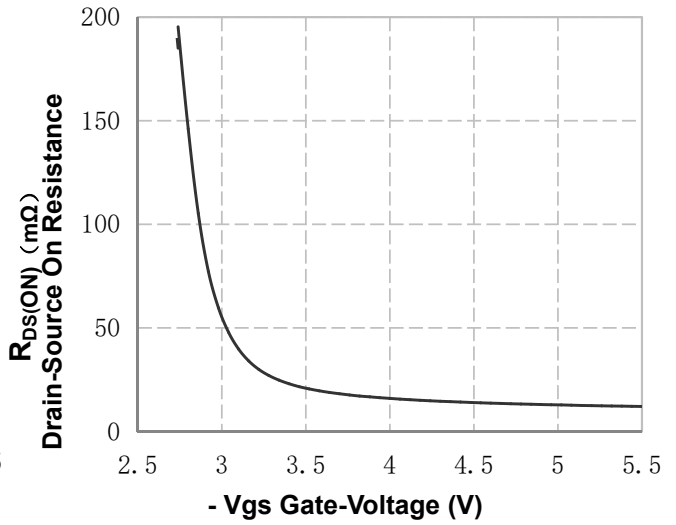


Figure 8. On-Resistance vs Gate Voltage

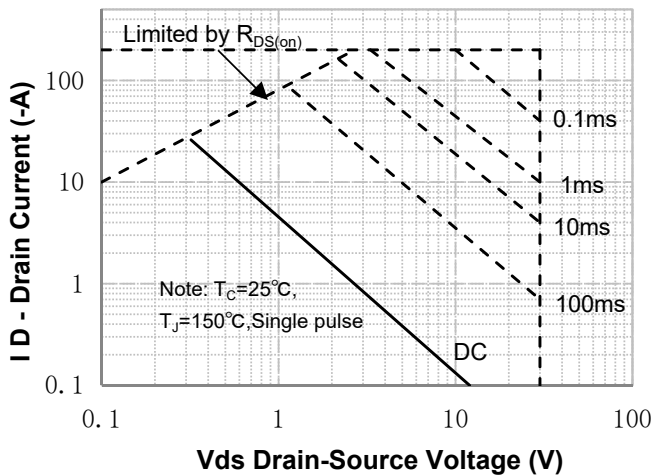


Figure 9. Maximum Safe Operating Area

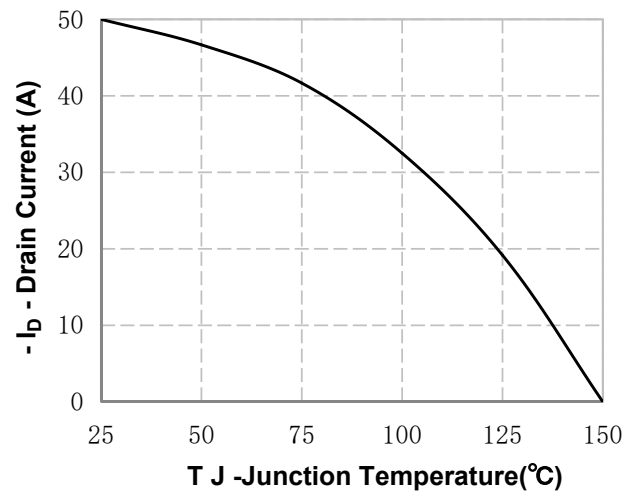


Figure 10. Maximum Continuous Drain Current vs Temperature

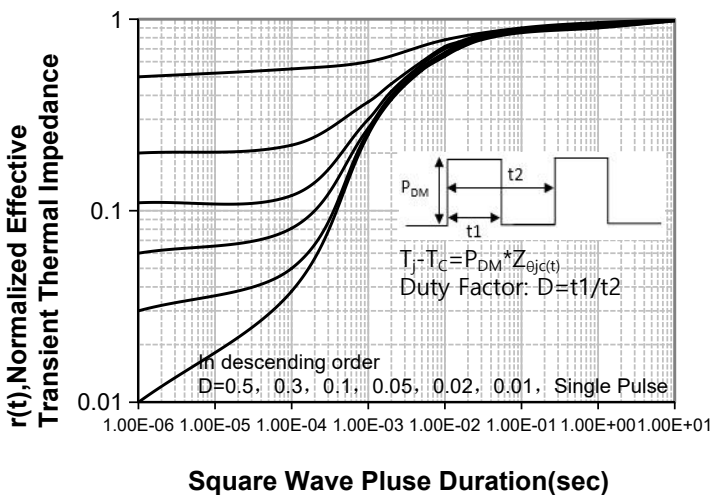
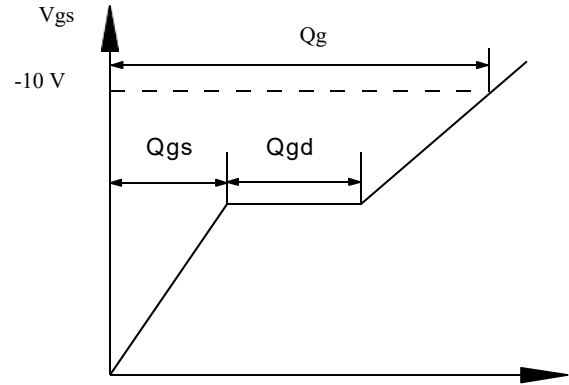
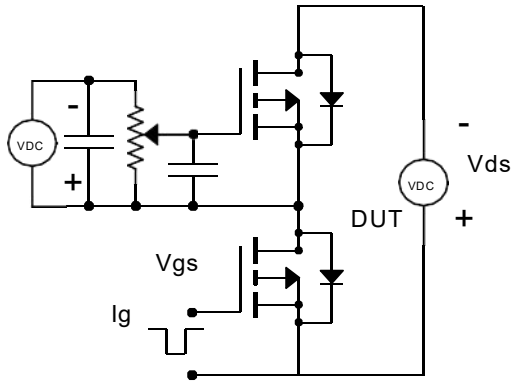


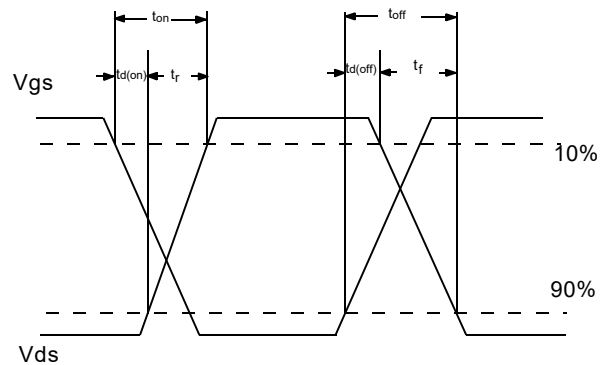
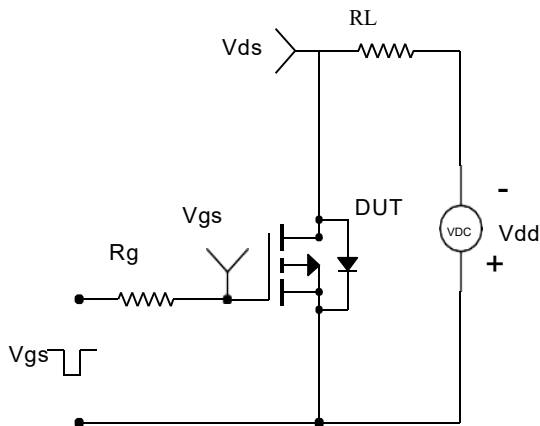
Figure 11. Transient Thermal Response Curve



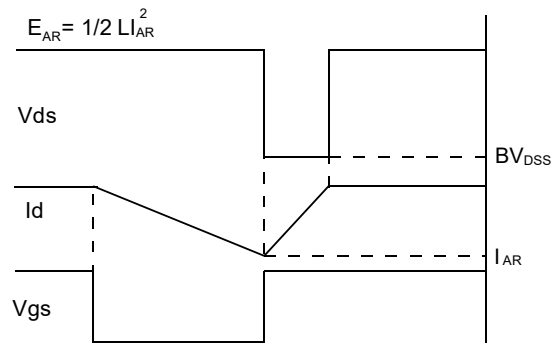
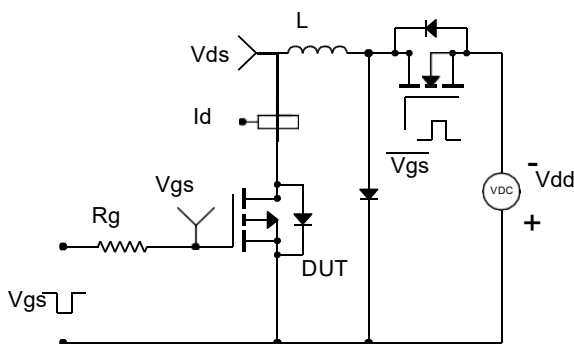
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

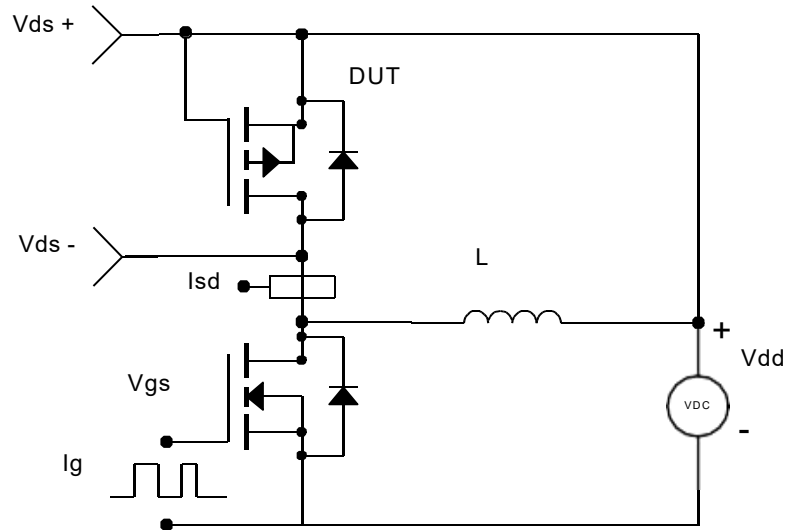


### Unclamped Inductive Switching Test Circuit & Waveforms

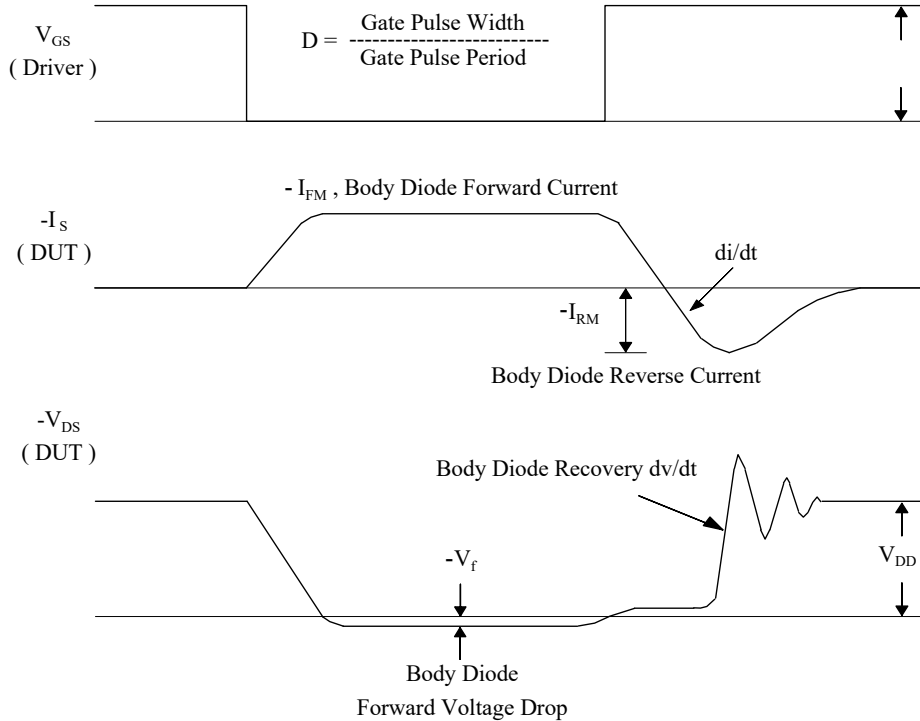




### Peak Diode Recovery dv/dt Test Circuit & Waveforms

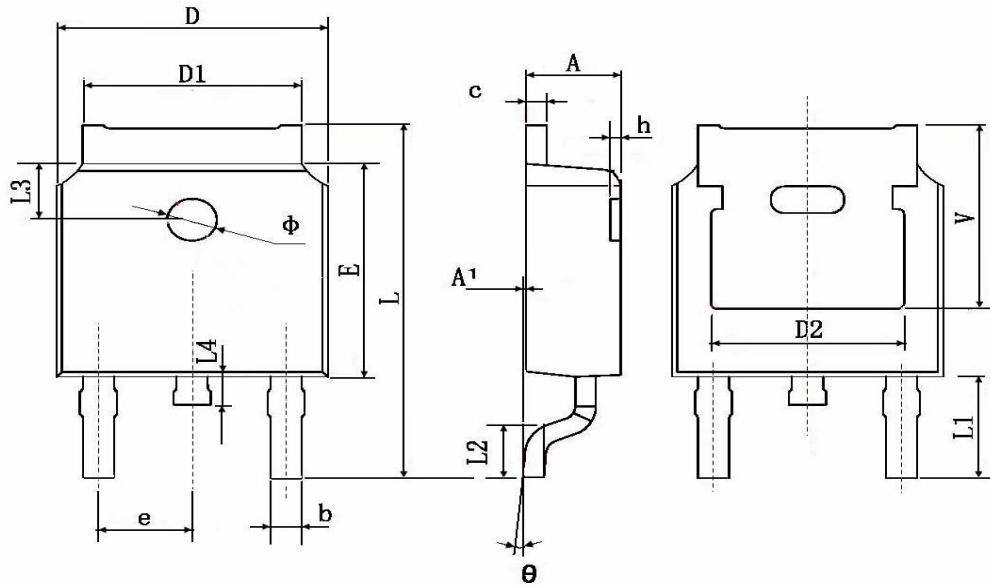


- $dv/dt$  controlled by  $R_g$
- $I_{SD}$  controlled by pulse period





**TO-252-2L Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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