



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.

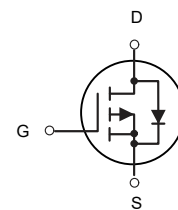
General Features

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

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

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 ($T_C=25^{\circ}C$ unless otherwise noted)

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



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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$	--	--	-1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}$, $V_{DS} = 0\text{ V}$	--	--	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-1.0	-1.5	-2.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}$, $I_D = -12\text{ A}$	--	9.3	12	m Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -7\text{ A}$	-	12.5	17	
C_{iss}	Input Capacitance	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$	--	1770	-	pF
C_{oss}	Output Capacitance		--	231	-	pF
C_{rss}	Reverse Transfer Capacitance		--	216	-	pF
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = -10\text{ V}$, $V_{DS} = -15\text{ V}$, $R_G = 3\text{ }\Omega$, $I_D = -25\text{ A}$	--	13	--	ns
t_r	Turn-On Rise Time		--	8.5	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	26	--	ns
t_f	Turn-Off Fall Time		--	12	--	ns
Q_g	Total Gate Charge	$V_{DS} = -15\text{ V}$, $I_D = -25\text{ A}$, $V_{GS} = -10\text{ V}$	--	32	--	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	10	--	nC
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	-50	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-200	A
V_{SD}	Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{ V}$, $I_{SD} = -10\text{ A}$, $T_J = 25^{\circ}\text{C}$		--	--	-1.2	V
t_{rr}	Reverse Recovery Time $T_J = 25^{\circ}\text{C}$, $I_F = -25\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		--	32	-	nS
Q_{rr}	Reverse Recovery Charge $T_J = 25^{\circ}\text{C}$, $I_F = -25\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		--	21	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^{\circ}\text{C}$, $V_{DD} = -20\text{ V}$, $V_G = -10\text{ V}$, $L = 0.5\text{ mH}$.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$



Typical Characteristics

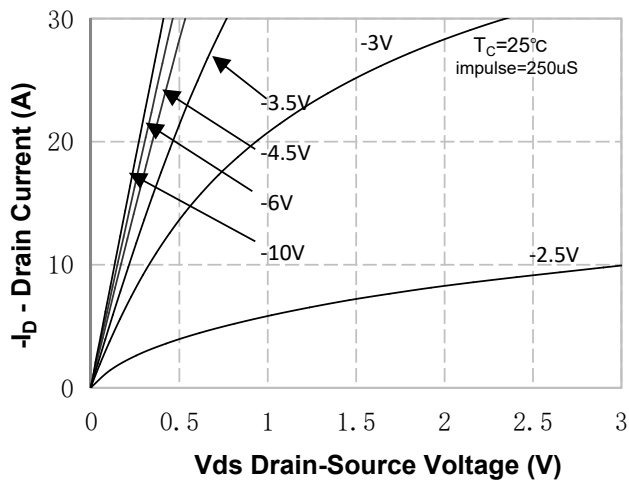


Figure 1. On-Region Characteristics

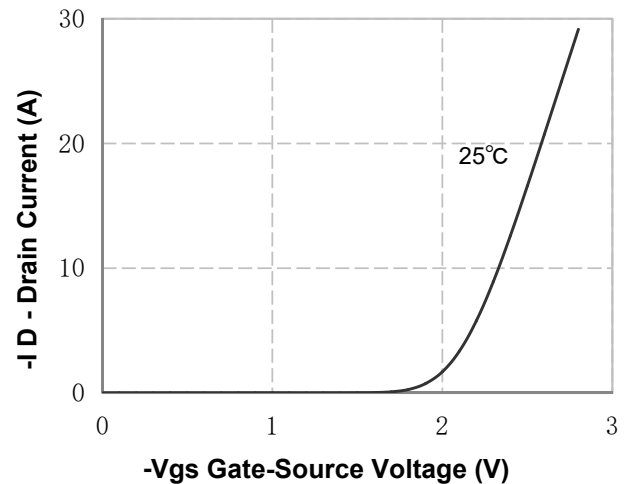


Figure 2. Transfer Characteristics

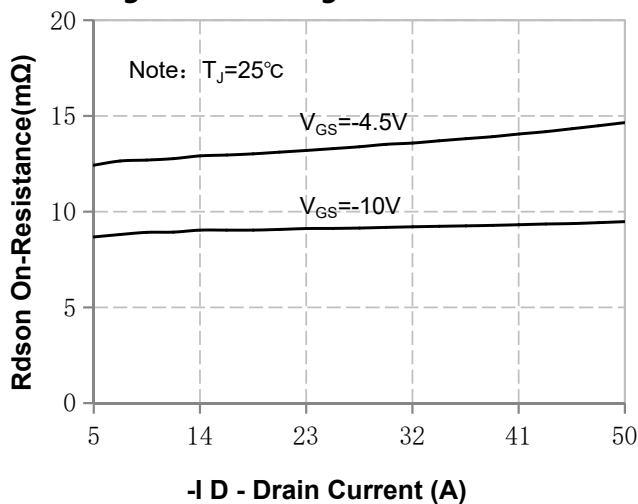


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

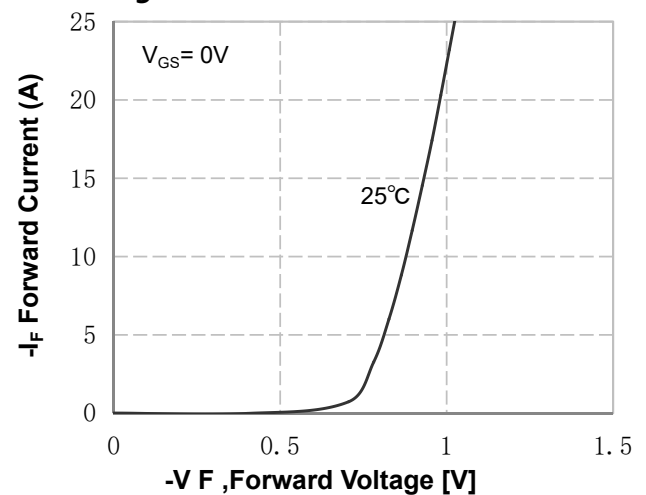


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

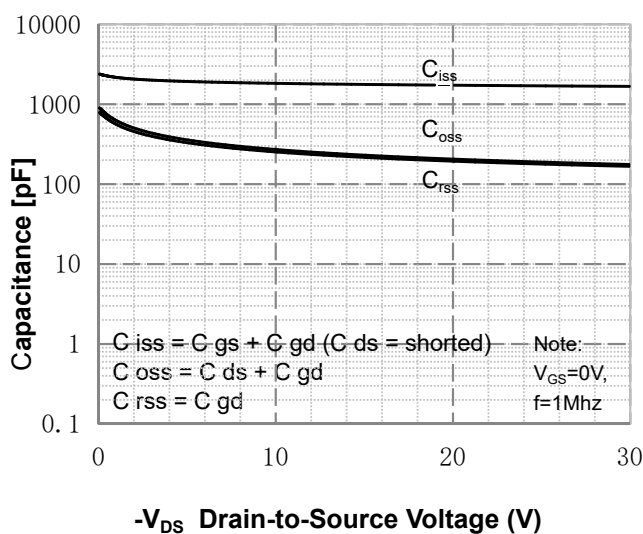


Figure 5. Capacitance Characteristics

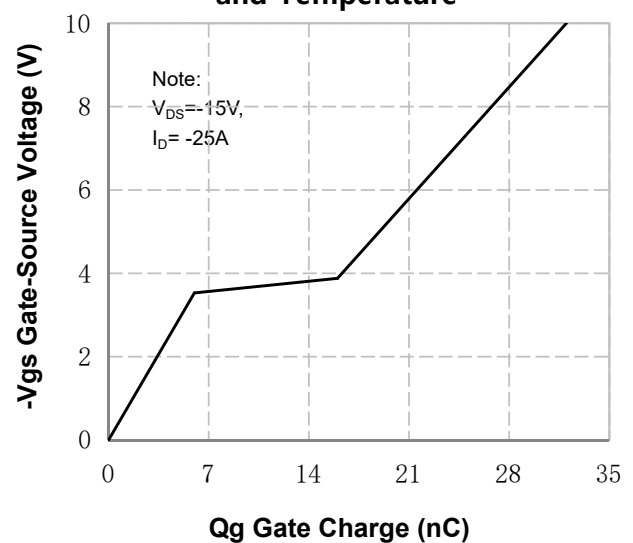


Figure 6. Gate Charge Characteristics

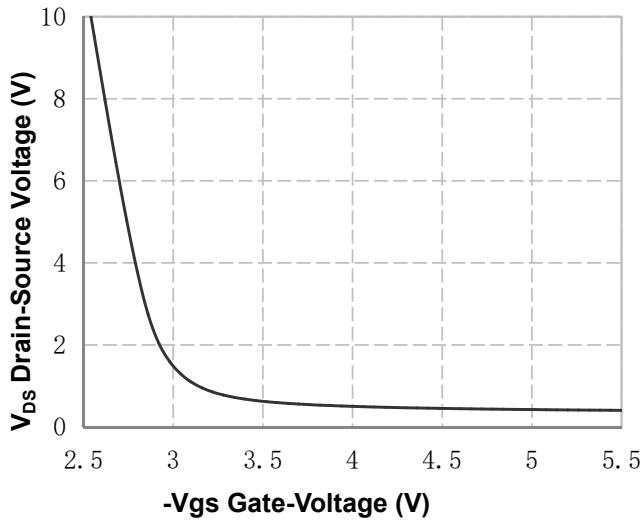


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

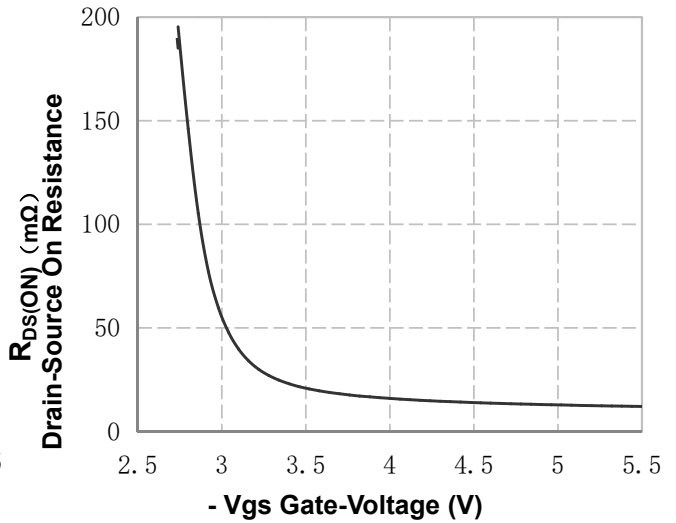


Figure 8. On-Resistance vs Gate Voltage

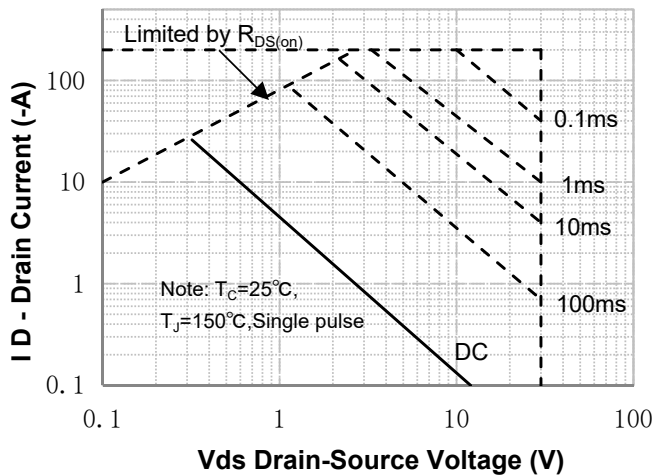


Figure 9. Maximum Safe Operating Area

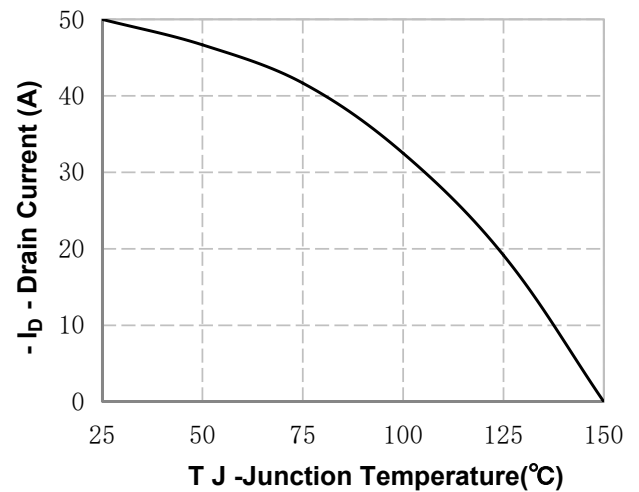


Figure 10. Maximum Continuous Drain Current vs Temperature

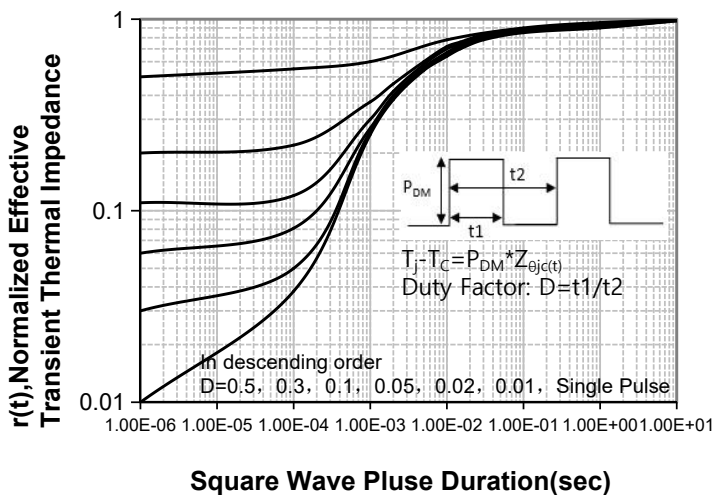
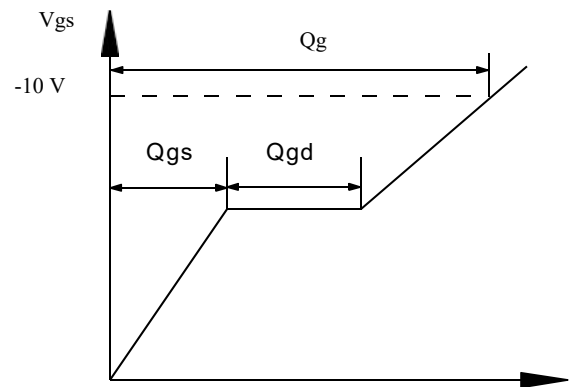
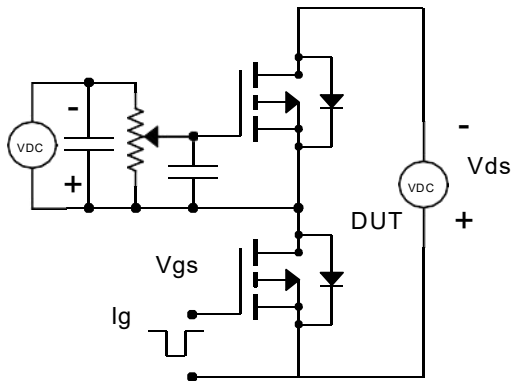


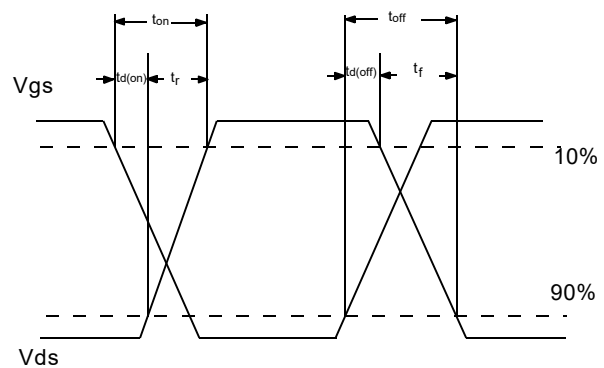
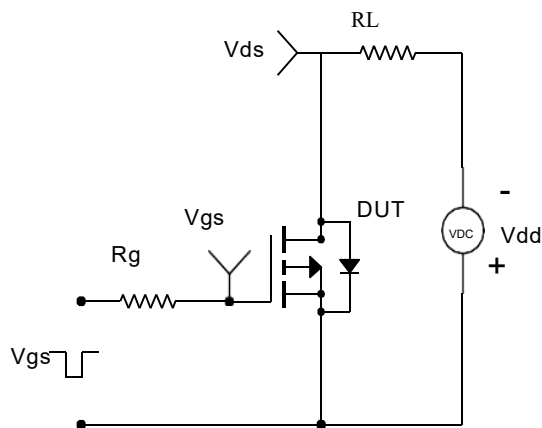
Figure 11. Transient Thermal Response Curve



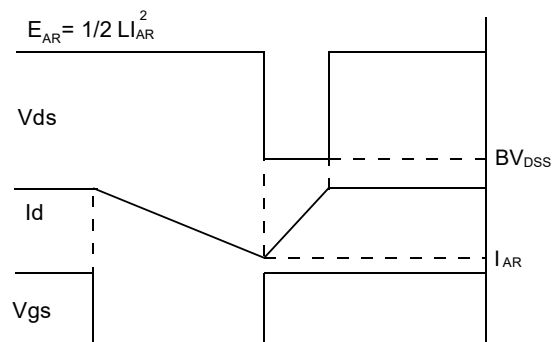
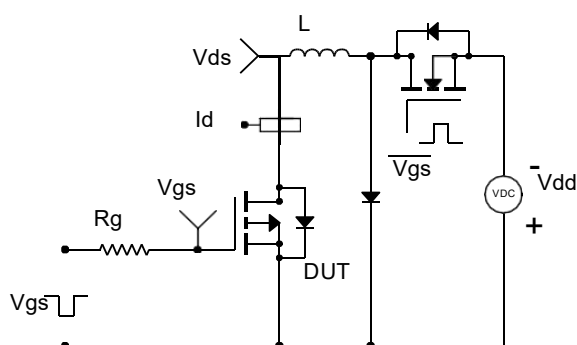
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

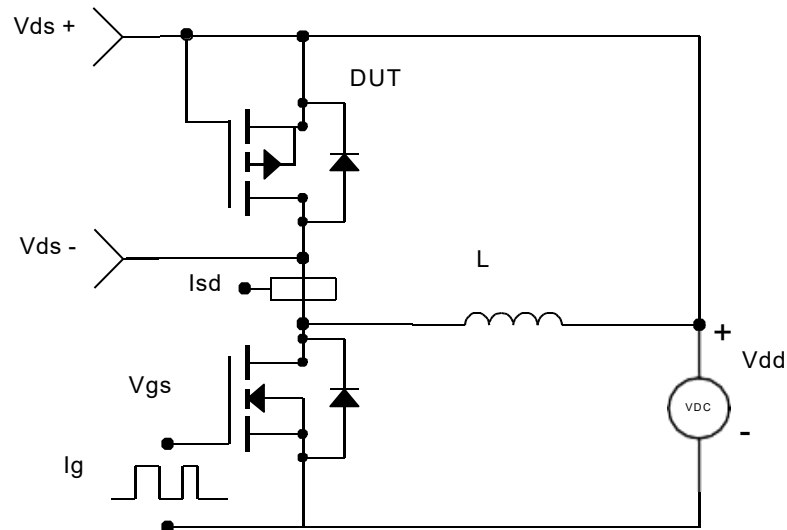


Unclamped Inductive Switching Test Circuit & Waveforms

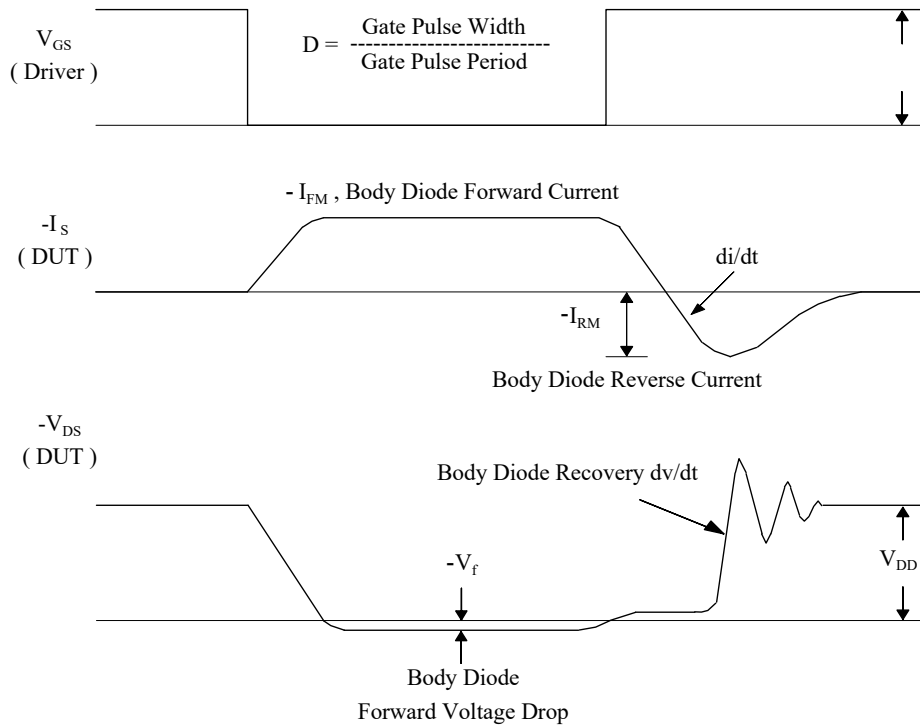




Peak Diode Recovery dv/dt Test Circuit & Waveforms

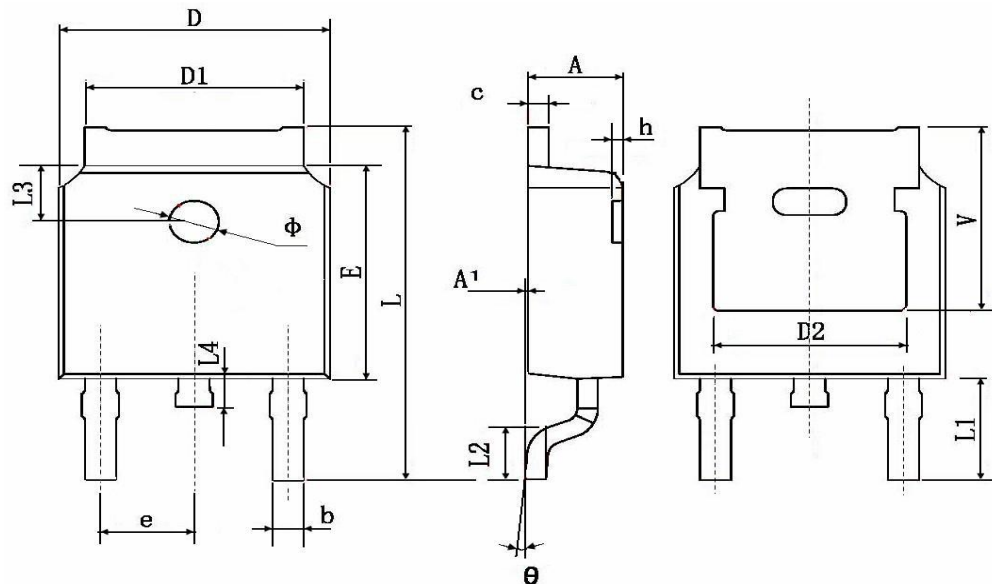


- dv/dt controlled by R_G
- I_{SD} controlled by pulse period





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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