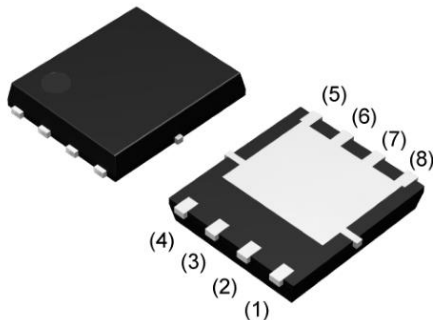


Description
45V N-CHANNEL ENHANCEMENT MODE POWER MOSFET
Features

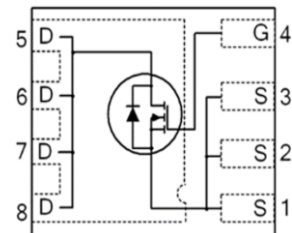
- Device Rating $V_{DS} = 45V$, $I_D = 228A$
- $R_{DS(ON)} = 1.3m\Omega$ (typ.) @ $V_{GS} = 10V$, $I_D = 20A$
- $R_{DS(ON)} = 1.7m\Omega$ (typ.) @ $V_{GS} = 4.5V$, $I_D = 10A$
- Proprietary High Density Trench Technology
- RoHS Compliant & Halogen-Free

Application

- PD charger
- E-tool

Package


DFN5*6
JFG228N45L


Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise specified

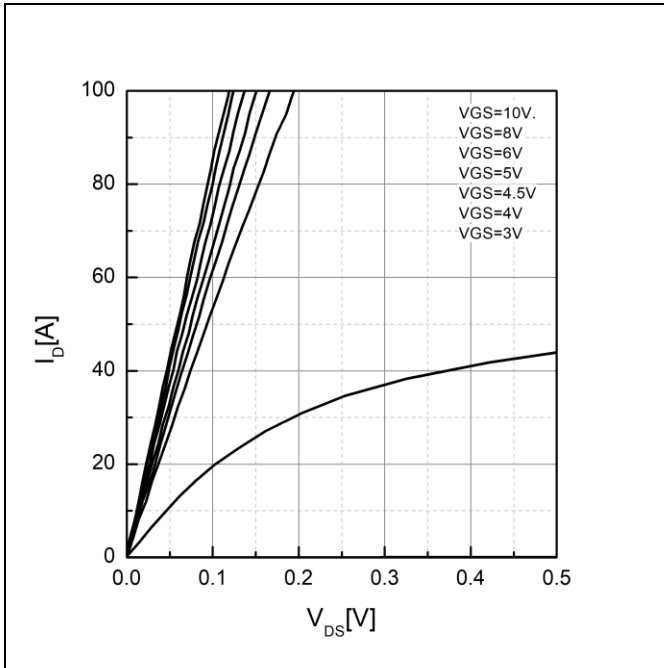
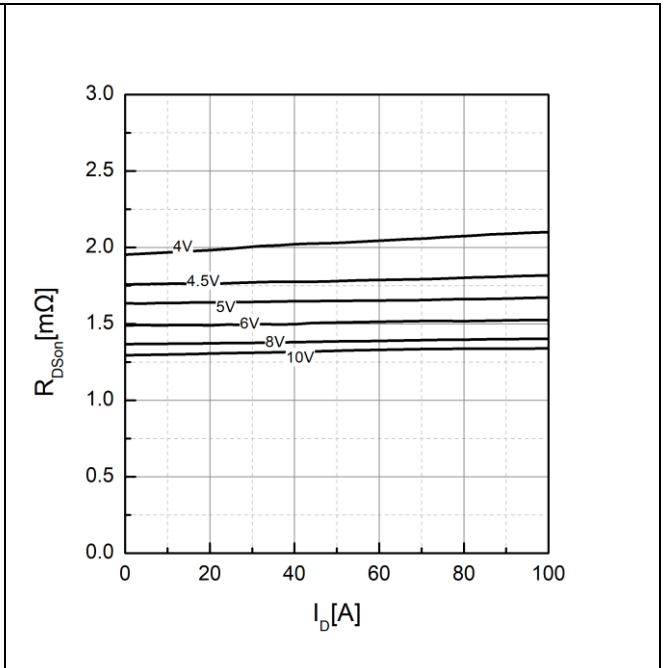
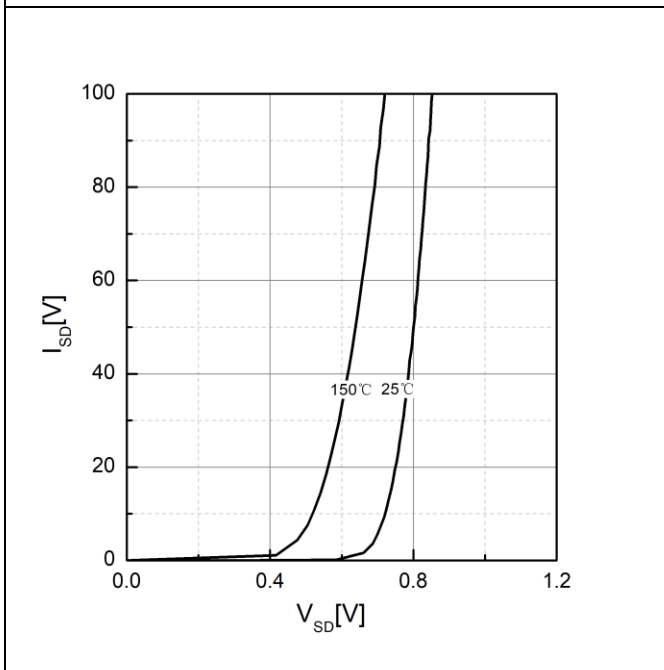
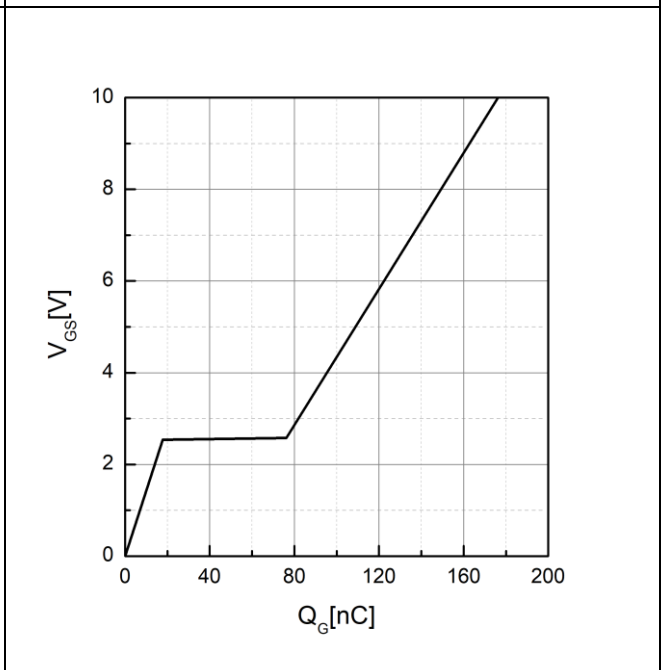
Symbol	Parameter	Max.	Units	
V_{DS}	Drain-Source Voltage	45	V	
V_{GS}	Gate-Source Voltage	± 20	V	
I_D	Continuous Drain Current, $V_{GS} @ 10V$ ^{note1}	$T_C = 25^\circ C$	228	A
		$T_C = 100^\circ C$	145	A
I_{DM}	Pulsed Drain Current ^{note2}	912	A	
P_D	Power Dissipation ^{note4}	$T_C = 25^\circ C$	131	W
	Power Dissipation	$T_A = 25^\circ C$	2.27	W
E_{AS}	Single Pulsed Avalanche Energy ^{note3}	383	mJ	
$R_{\theta JC}$	Thermal Resistance, Junction to Case ^{note1}	0.95	$^\circ C/W$	
$R_{\theta JA}$	Junction-to-Ambient (mounted on 1 inch square PCB)	55	$^\circ C/W$	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$	

Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	45	-	-	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 45V, V_{GS} = 0V$	-	-	1	μA
		$V_{DS} = 45V, V_{GS} = 0V, T_C = 55^{\circ}\text{C}$	-	-	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-100	-	100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	-	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^{note2}	$V_{GS} = 10V, I_D = 20A$	-	1.3	1.6	m Ω
		$V_{GS} = 4.5V, I_D = 20A$	-	1.7	2.1	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10V, I_D = 20A$		69	-	S
Dynamic Characteristics						
R_g	Gate Resistance		-	1.3	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 20V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	-	7160	-	pF
C_{oss}	Output Capacitance		-	1130	-	pF
C_{rss}	Reverse Transfer Capacitance		-	1080	-	pF
Q_g	Total Gate Charge	$V_{DS} = 20V, I_D = 20A,$ $V_{GS} = 10V$	-	176	-	nC
Q_{gs}	Gate-Source Charge		-	17.8	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	58.4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20V, I_D = 20A,$ $R_G = 8\Omega, V_{GS} = 10V$	-	32	-	ns
t_r	Turn-On Rise Time		-	96	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	108	-	ns
t_f	Turn-Off Fall Time		-	68	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Diode Forward Current ^{note1,5}		-	-	109	A
I_{SM}	Maximum Pulsed Diode Forward Current ^{note2,5}		-	-	912	A
t_{rr}	Reverse Recovery Time	$T_J = 25^{\circ}\text{C}, I_S = 20A,$ $V_{GS} = 0V$	-	65	-	ns
Q_{rr}	Reverse Recovery Charge	$T_J = 25^{\circ}\text{C}, I_S = 20A,$ $di/dt = 150A/\mu s$		32		nC
V_{SD} ^{note2}	Drain to Source Diode Forward Voltage	$T_J = 25^{\circ}\text{C}, I_S = 20A,$ $V_{GS} = 0V$	-	0.72	-	V

Note :

- 1.The data tested by surface mounted on one inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 3.The EAS data shows Max. rating. The test condition is $V_{DD}=40V, V_{GS}=10V, L=0.1mH, I_{AS}= 87.5 A$.
- 4.The power dissipation is limited by 150°C junction temperature.
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Performance Characteristics

Figure 1. Output Characteristics, $T_J=25^\circ\text{C}$

Figure 2. Drain-source on resistance , $T_J=25^\circ\text{C}$

Figure 3. Forward characteristics of body diode

Figure 4. Gate Charge Characteristics

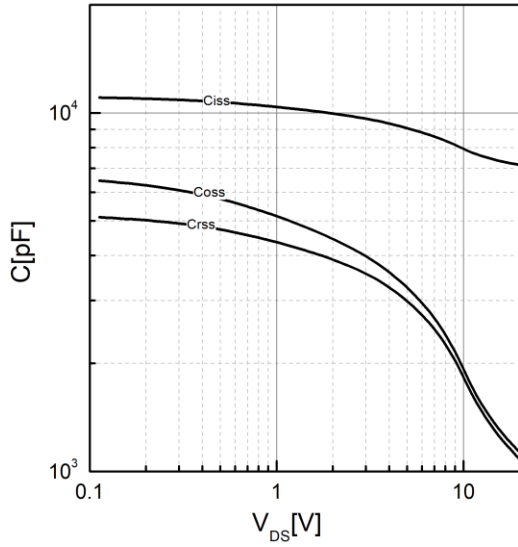


Figure 5. Capacitance Characteristics

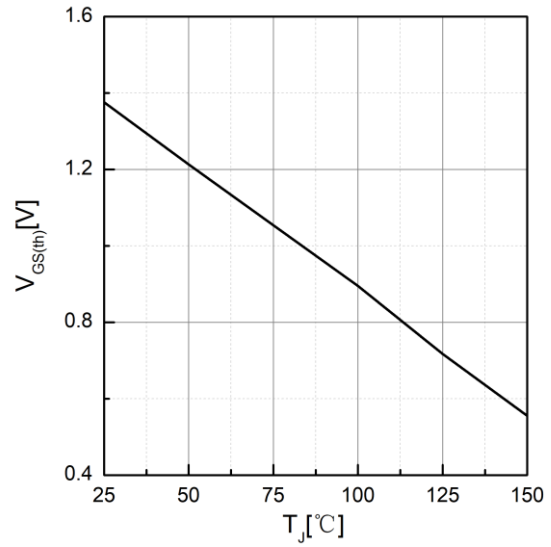


Figure 6. Threshold Voltage Vs. Temperature

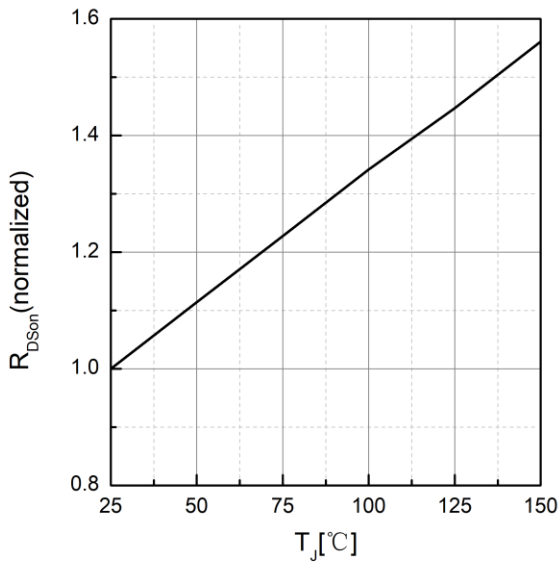


Figure 7. Drain-source on-state resistance

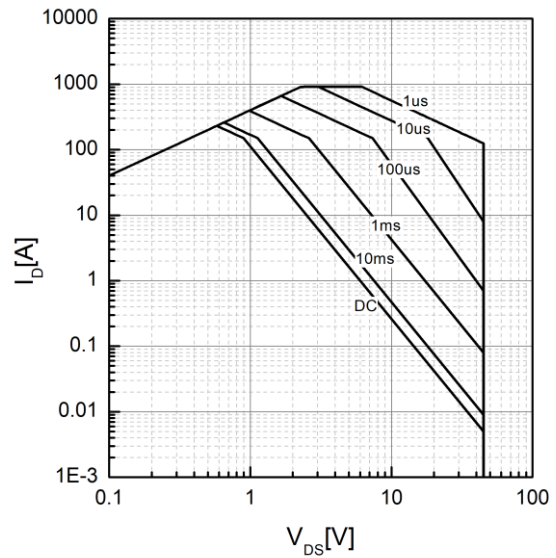


Figure 8. Maximum Safe Operating Area

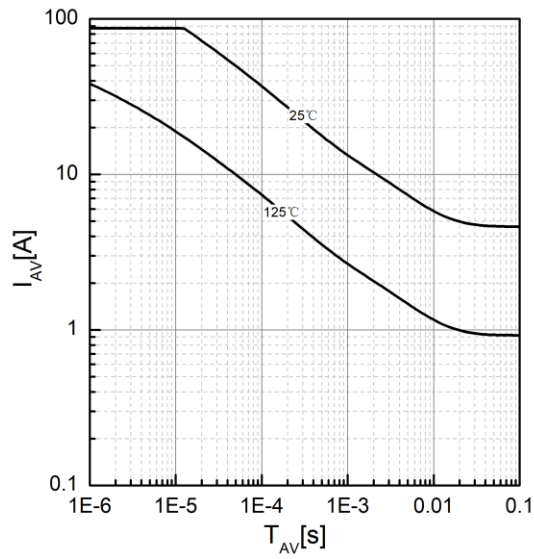


Figure 9. Avalanche characteristics

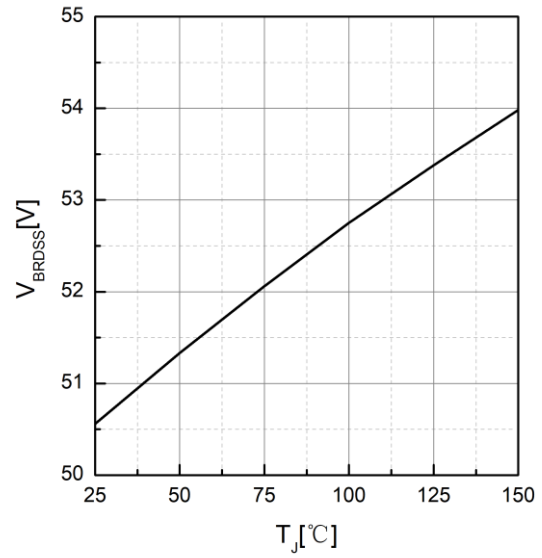


Figure 10. Drain-source breakdown voltage

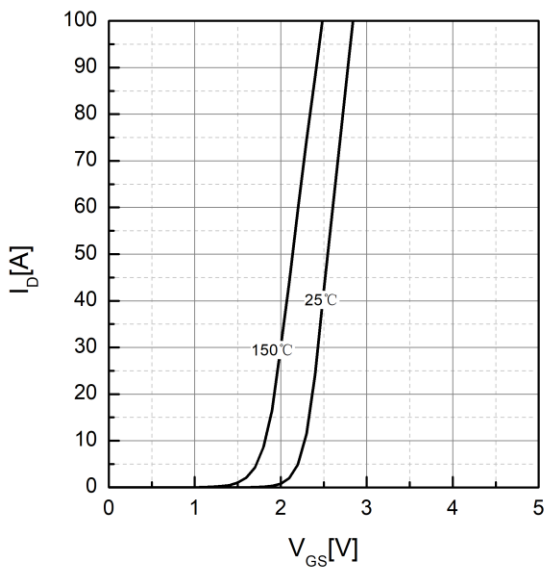


Figure 11. Transfer characteristics

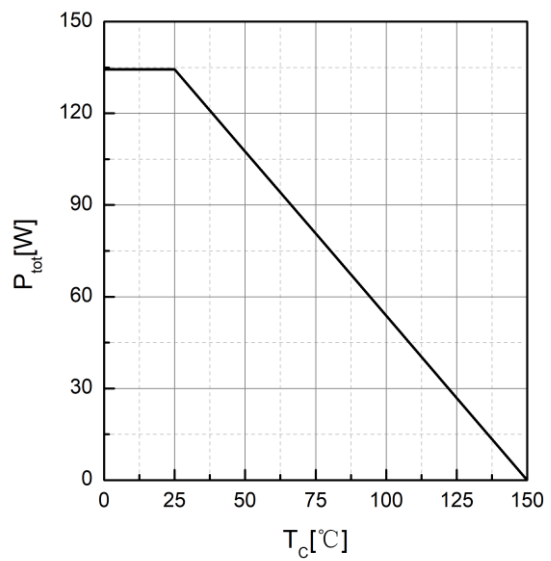


Figure 12. Power dissipation

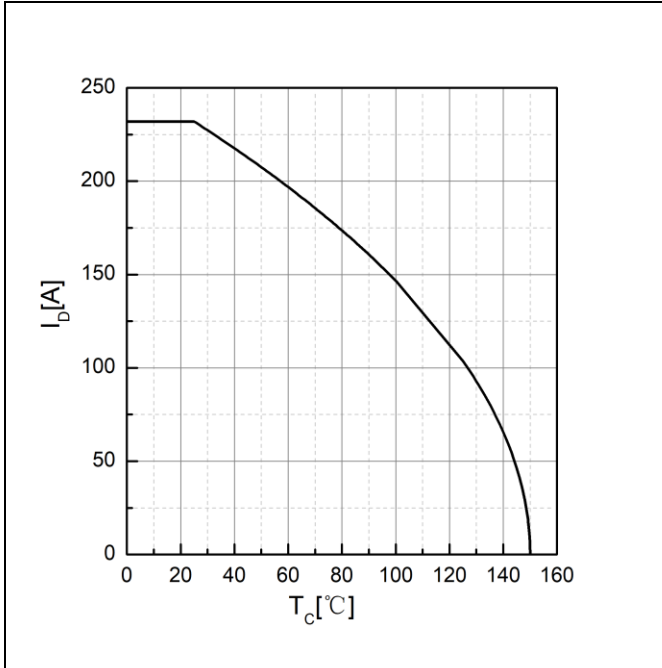


Figure 13. Drain current

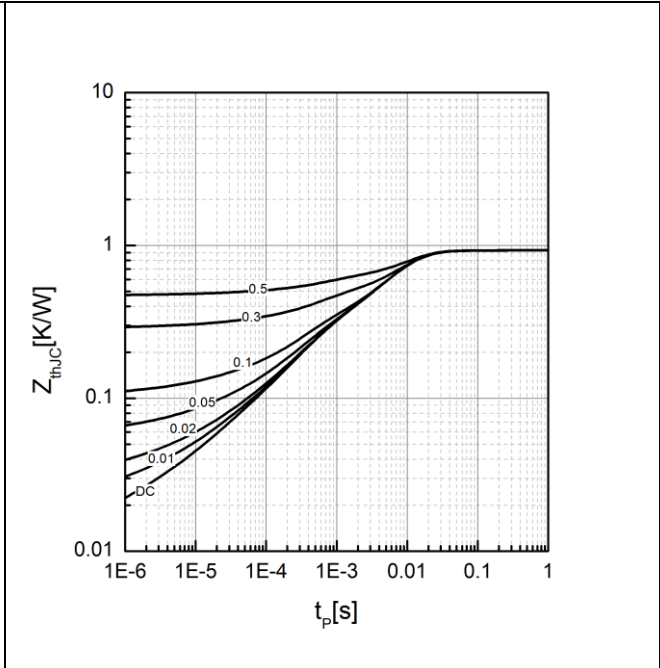


Figure 14. Effective Transient Thermal Impedance

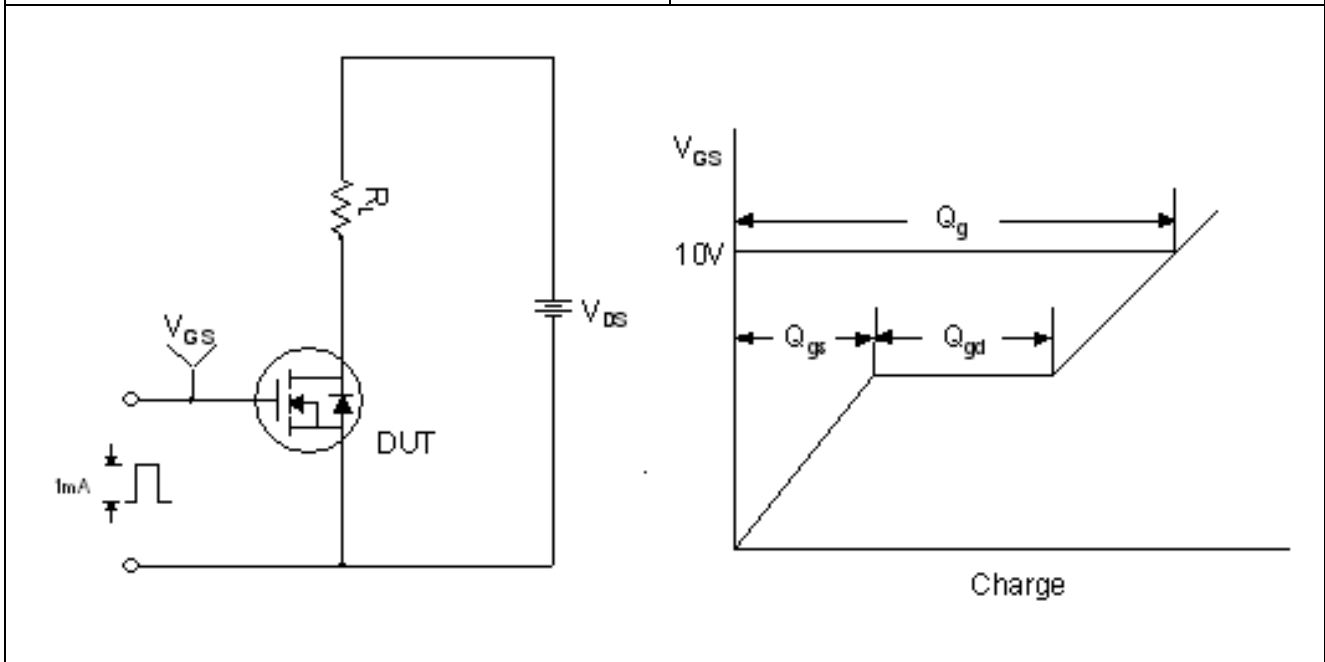
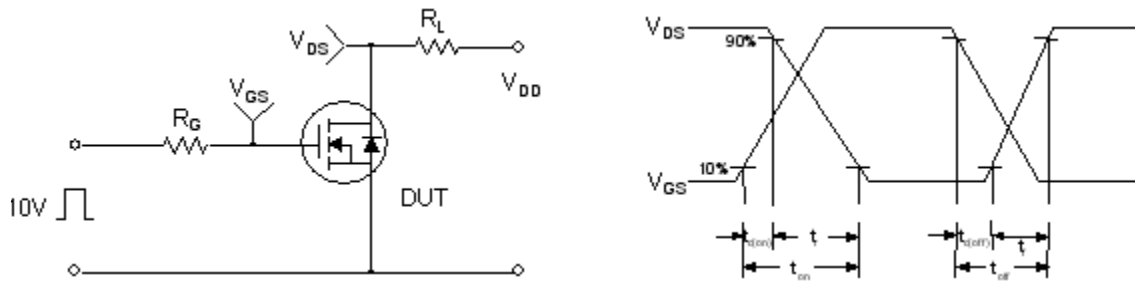
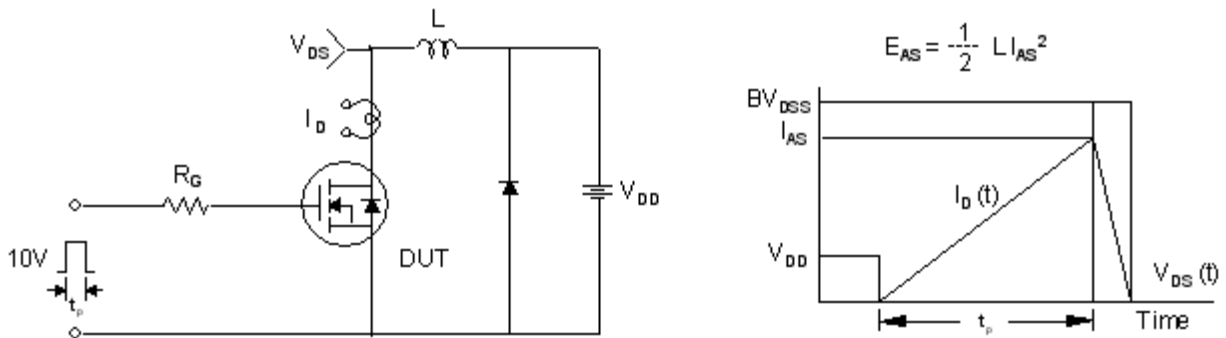


Figure 15. Gate Charge Test Circuit & Waveform


Figure 16. Resistive Switching Test Circuit & Waveforms

Figure 17. Unclamped Inductive Switching Test Circuit & Waveforms

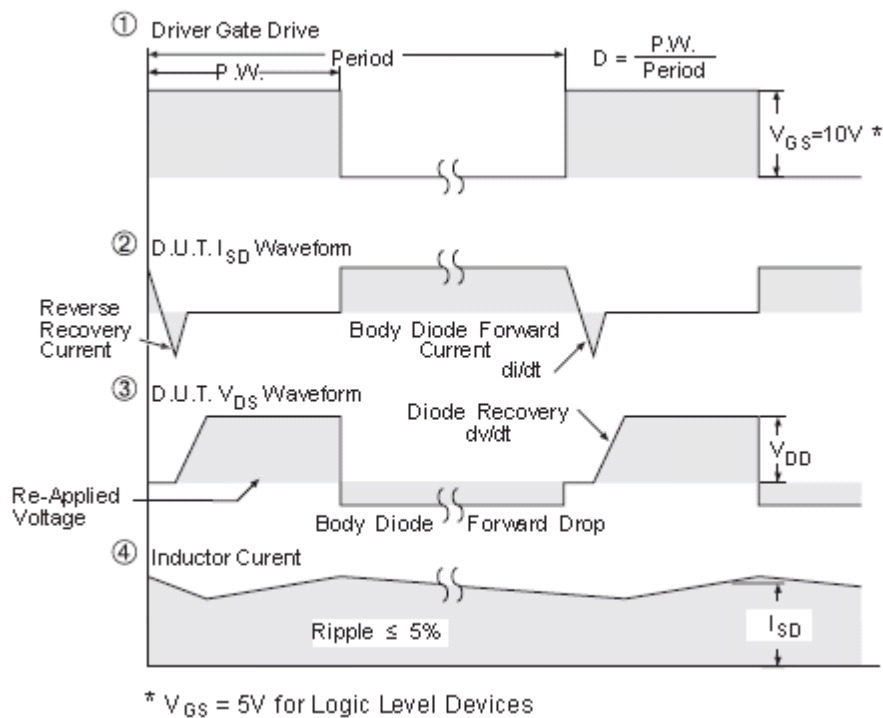
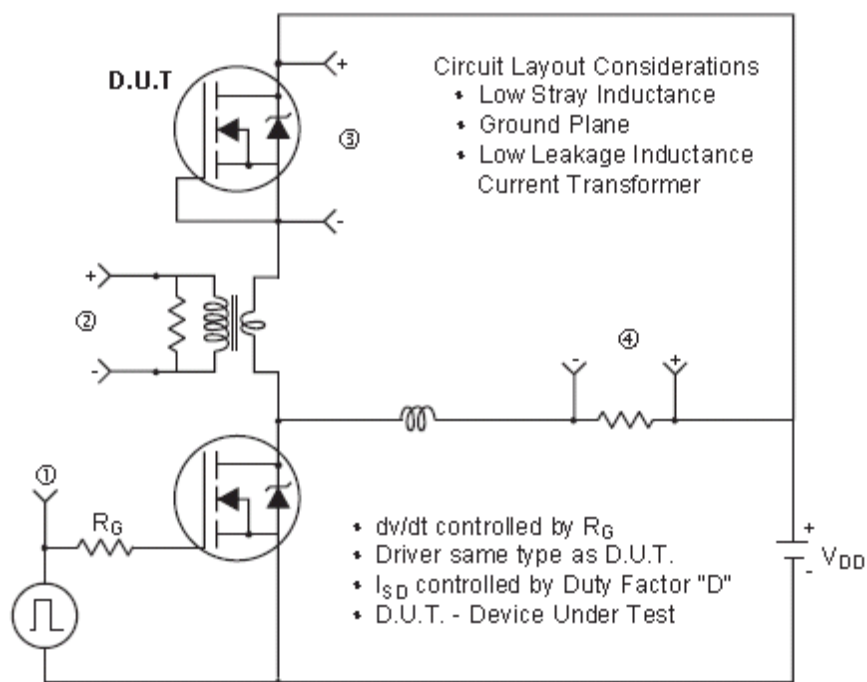
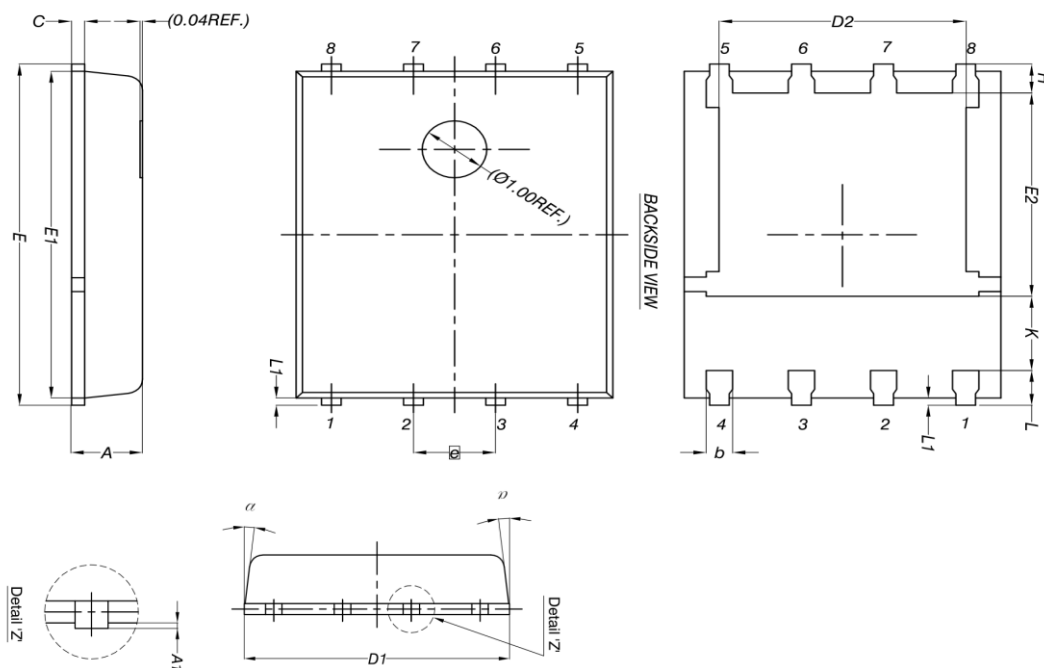
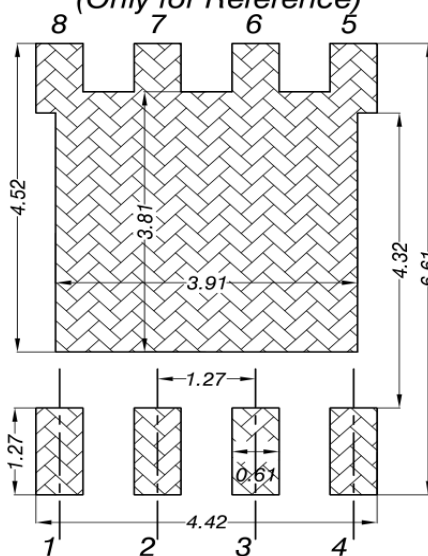


Figure 18. Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

Package outline


DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

**Land Pattern
(Only for Reference)**

Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar , Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.

Figure 19. DFN 5x6 Package outline

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