GSMDB2116S

20V N+P Dual Channel MOSFETs

Product Description

These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for high efficiency fast switching applications.

Features

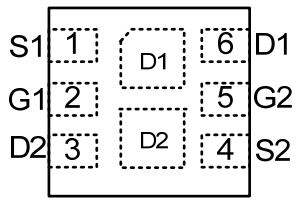
- N-Channel
  20V, 5A, $R_{DS(ON)}$=40mΩ@V_{GS}=4.5V
- P-Channel
  -20V, -4.7A, $R_{DS(ON)}$=95mΩ@V_{GS}=-4.5V
- Fast switching
- Suit for -1.8V/1.8V Gate Drive Applications
- Green Device Available
- DFN2X2-6L package design

Applications

- Notebook
- Load Switch
- Networking
- Hand-held Instruments

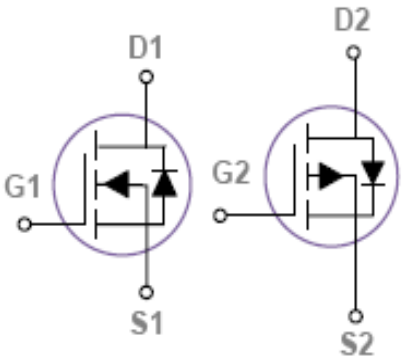
Packages & Pin Assignments

GSMDB2116SFF (DFN2X2-6L)

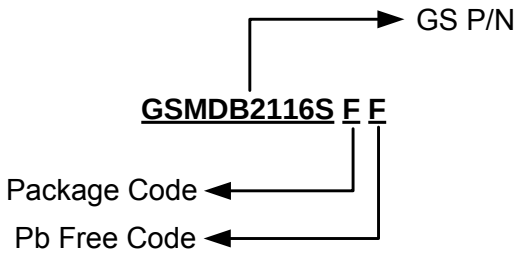


Top Views

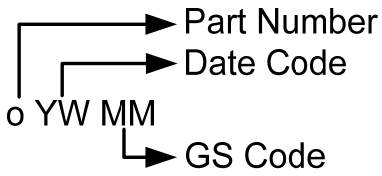
Pin	Description
1	Source 1
2	Gate 1
3	Drain 2
4	Source 2
5	Gate 2
6	Drain 1



Ordering Information



Marking Information



Part Number	Package	Part Marking	Quantity
GSMDB2116SFF	DFN2X2-6L	oYWMM	3000pcs

Absolute Maximum Ratings

T_C=25ºC Unless otherwise noted

Symbol	Parameter		Typical		Unit
			N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage		20	-20	V
V_{GS}	Gate-Source Voltage		±10	±10	V
I_D	Continuous Drain Current(T_J=150℃)	T_C=25℃	5	-4.7	A
		T_C=100℃	4.1	-3.9	
I_{DM}	Pulsed Drain Current (Note 1)		15.2	-10	A
P_D	Power Dissipation	T_C=25℃	1.56	1.56	W
		Derate above 25℃	0.01	0.01	W/℃
T_J	Operating Junction Temperature Range		-55 to +150		℃
T_{STG}	Storage Temperature Range		-55 to +150		℃
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		80		℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		15		℃/W

Note 1: Repetitive Rating: Pulsed width limited by maximum junction temperature.

Electrical Characteristics (N-Channel)

T_J=25℃ Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	20			V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=1mA		0.02		V/℃
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	0.3	0.6	1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient			-2		mV/℃
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±10V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V,V_{GS}=0V			1	uA
		V_{DS}=16V,V_{GS}=0V, T_J=125℃			10	
I_S	Continuous Source Current	V_G=V_D=0V, Force Current			5	A
I_{SM}	Pulsed Source Current				10	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=4.5V,I_D=3A		30	40	mΩ
		V_{GS}=2.5V,I_D=2A		42	55	
		V_{GS}=1.8V,I_D=1.5A		55	70	
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=2A		4.4		S
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=1A			1	V
Dynamic						
Q_g	Total Gate Charge (Note 2,3)	V_{DS}=10V,V_{GS}=4.5V, I_D=3A		5.8	10	nC
Q_{gs}	Gate-Source Charge (Note 2,3)			0.6	1.5	
Q_{gd}	Gate-Drain Charge (Note 2,3)			1.5	3	
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1MHz		315	600	pF
C_{oss}	Output Capacitance			50	80	
C_{rss}	Reverse Transfer Capacitance			40	60	
$t_{d(on)}$	Turn-On Time (Note 2,3)	V_{DD}=10V,I_D=1A, V_{GS}=4.5V,R_G=25Ω		2.9	6	ns
t_r				8.4	16	
$t_{d(off)}$	Turn-Off Time (Note 2,3)			19.2	38	
t_f				5.6	12	

Note 2: The data tested by pulsed, pulse width≦300us, duty cycle≦2%.

Note 3: Essentially independent of operating temperature.

Electrical Characteristics (P-Channel)

T_J=25℃ Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=-250uA	-20			V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=-1mA		-0.01		V/℃
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250uA	-0.3	-0.6	-1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient			3		mV/℃
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±10V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V,V_{GS}=0V			-1	uA
		V_{DS}=-16V,V_{GS}=0V, T_J=125℃			-10	
I_S	Continuous Source Current	V_G=V_D=0V, Force Current			-4.7	A
I_{SM}	Pulsed Source Current				-9.4	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS} =-4.5V,I_D=-3A		80	95	mΩ
		V_{GS} =-2.5V,I_D=-2A		109	125	
		V_{GS} =-1.8V,I_D=-1A		148	161	
g_{FS}	Forward Transconductance	V_{DS}=-10V,I_D=-1A		2.2		S
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=-1A			-1	V
Dynamic						
Q_g	Total Gate Charge (Note 2,3)	V_{DS}=-10V,V_{GS}=-4.5V, I_D=-2A		4.8	10	nC
Q_{gs}	Gate-Source Charge (Note 2,3)			0.5	1	
Q_{gd}	Gate-Drain Charge (Note 2,3)			1.9	4	
C_{iss}	Input Capacitance	V_{DS}=-15V,V_{GS}=0V, f=1MHz		350	510	pF
C_{oss}	Output Capacitance			65	95	
C_{rss}	Reverse Transfer Capacitance			50	75	
$t_{d(on)}$	Turn-On Time (Note 2,3)	V_{DD}=-10V,I_D=-1A, V_{GS}=-4.5V,R_G=25Ω		3.5	7	ns
t_r				12.6	24	
$t_{d(off)}$	Turn-Off Time (Note 2,3)			32.6	62	
t_f				8.4	16	

Note 2: The data tested by pulsed, pulse width≦300us, duty cycle≦2%.

Note 3: Essentially independent of operating temperature.

Typical Performance Characteristics (N-Channel)

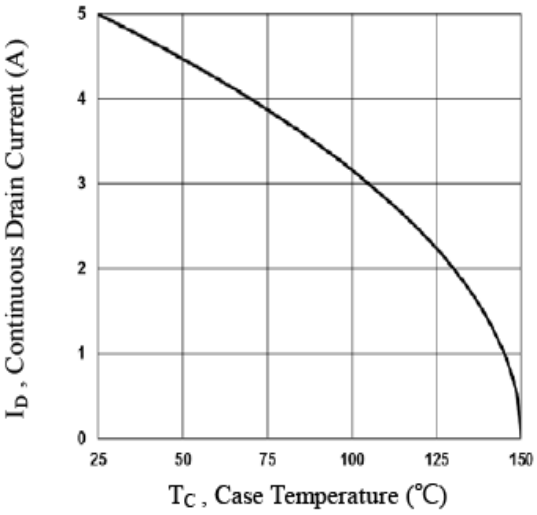


Fig.1 Continuous Drain Current vs. T_c

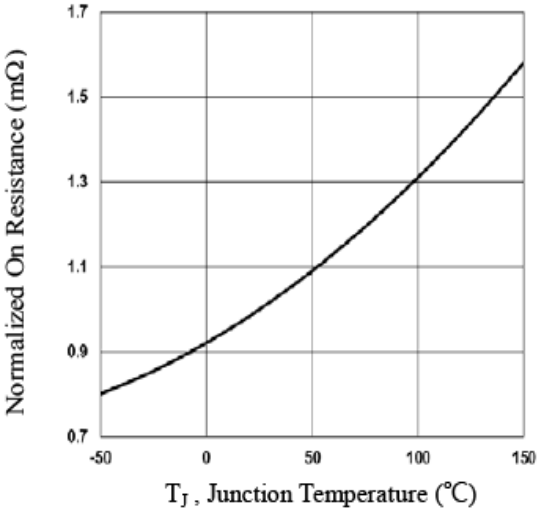


Fig.2 Normalized RDSON vs. T_J

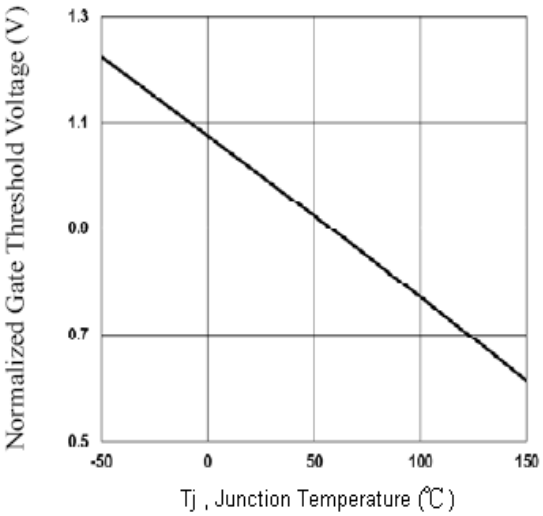


Fig.3 Normalized V_{th} vs. T_J

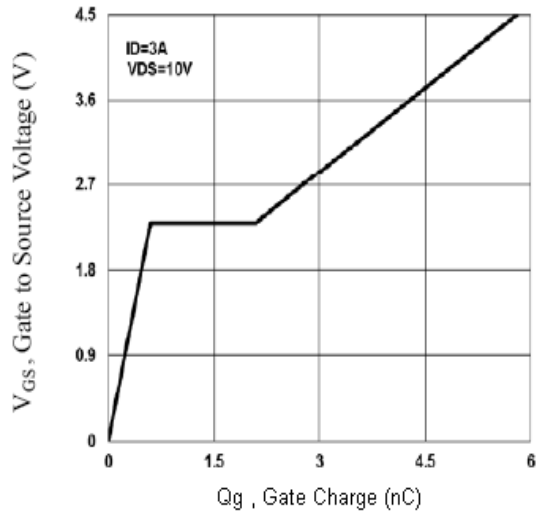


Fig.4 Gate Charge Waveform

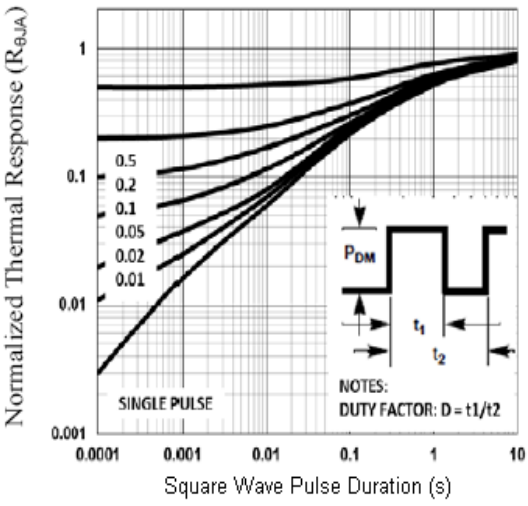


Fig.5 Normalized Transient Impedance

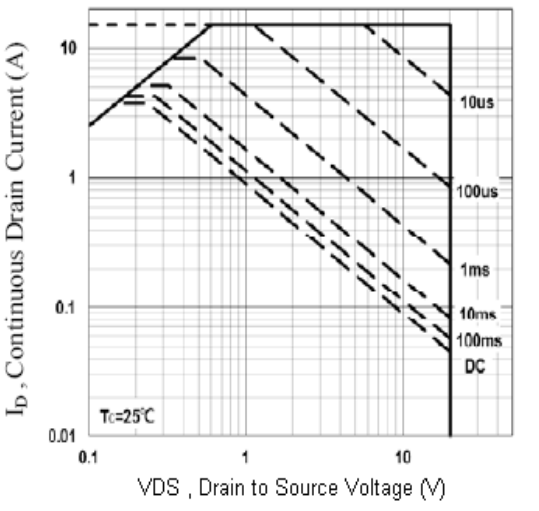
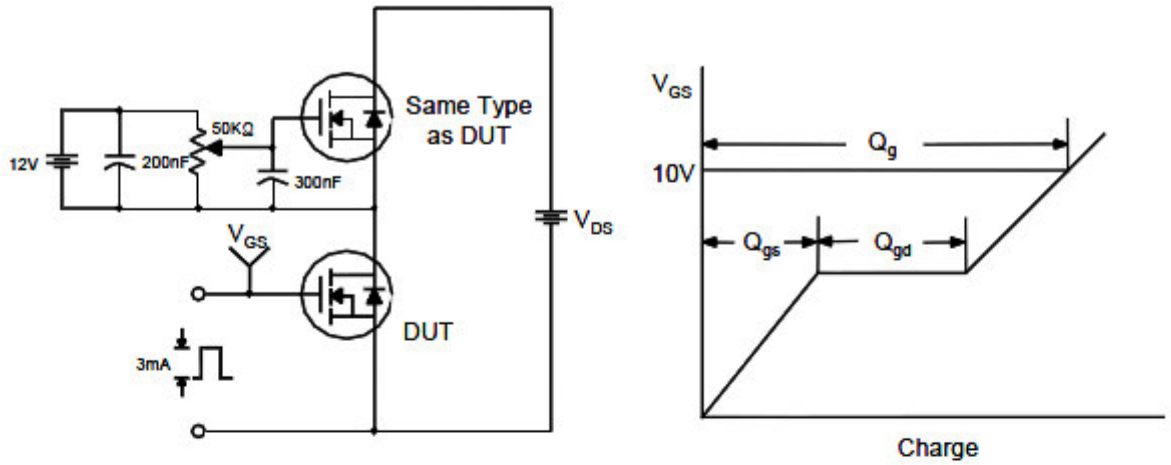


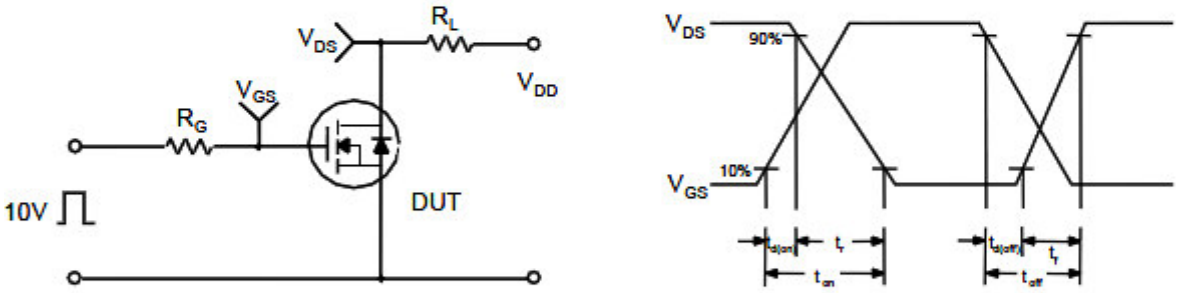
Fig.6 Maximum Safe Operation Area

Typical Performance Characteristics (N-Channel)

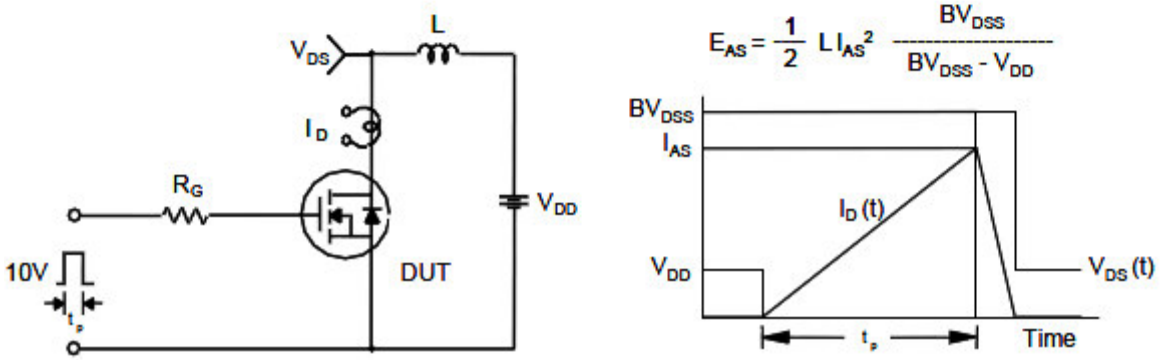
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Typical Performance Characteristics (P-Channel)

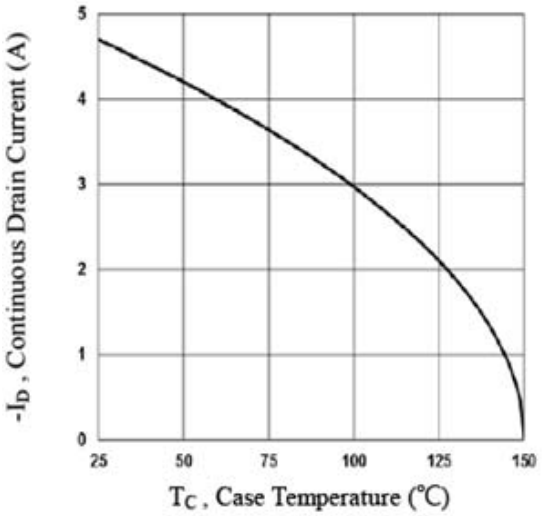


Fig.7 Continuous Drain Current vs. T_c

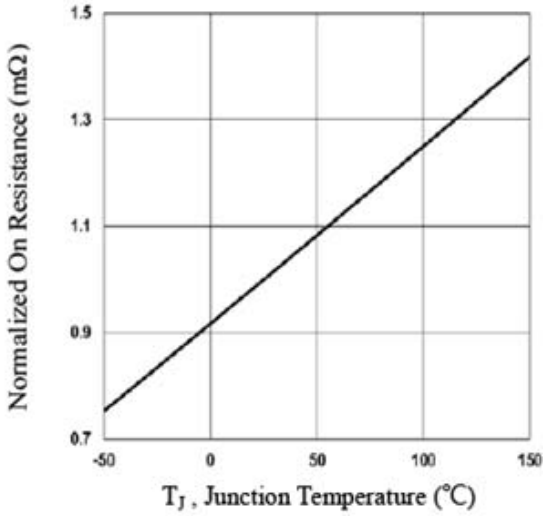


Fig.8 Normalized RDSON vs. T_J

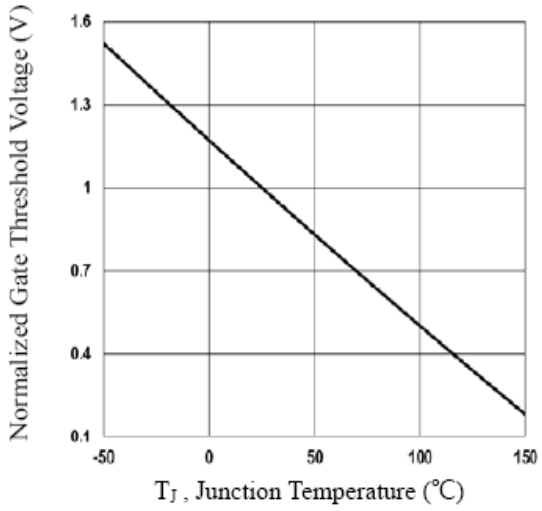


Fig.9 Normalized V_{th} vs. T_J

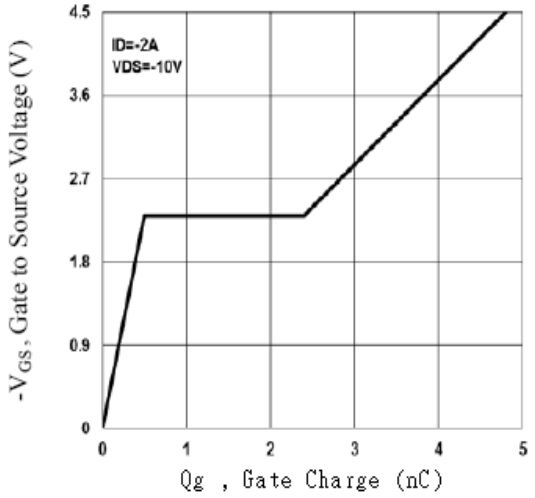


Fig.10 Gate Charge Waveform

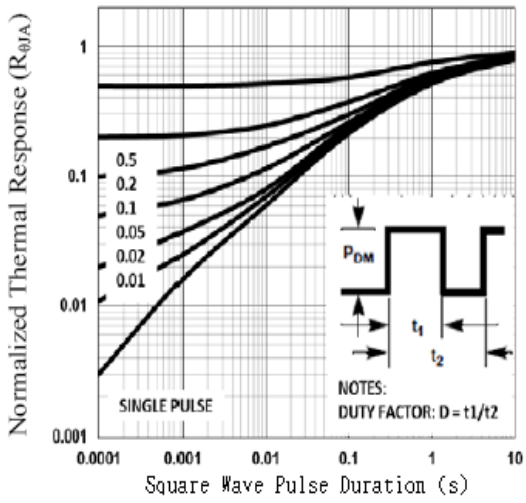


Fig.11 Normalized Transient Impedance

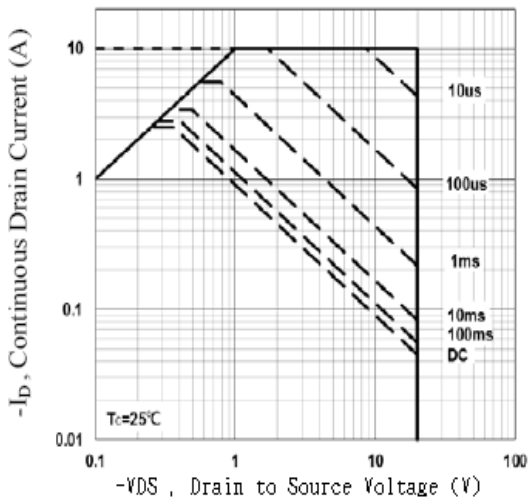
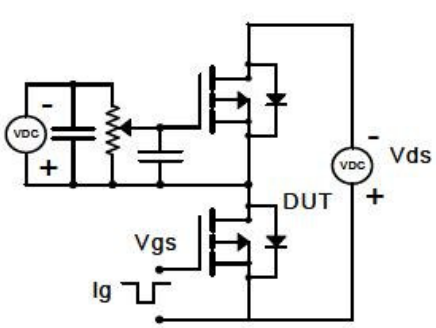
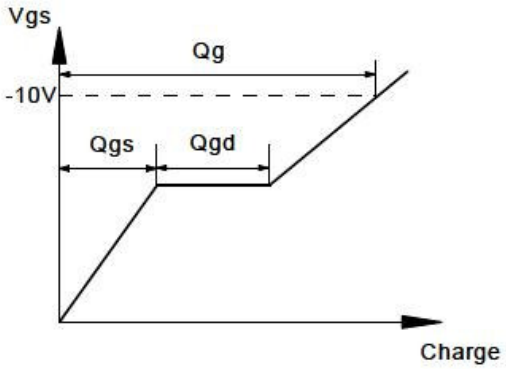


Fig.12 Maximum Safe Operation Area

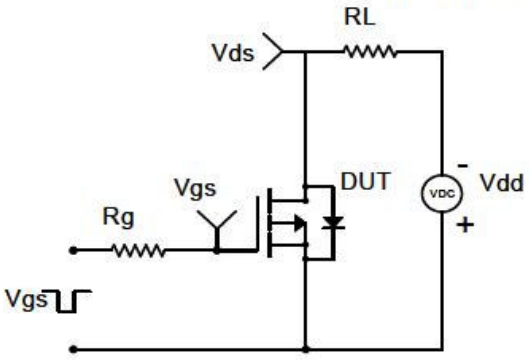
Typical Performance Characteristics (P-Channel)

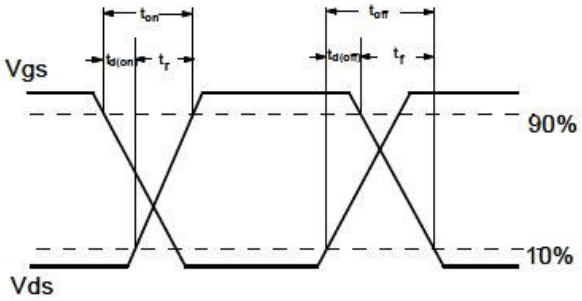
Gate Charge Test Circuit & Waveform



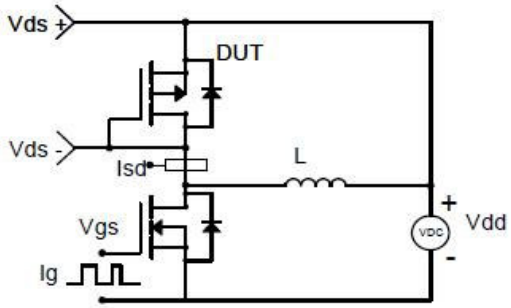


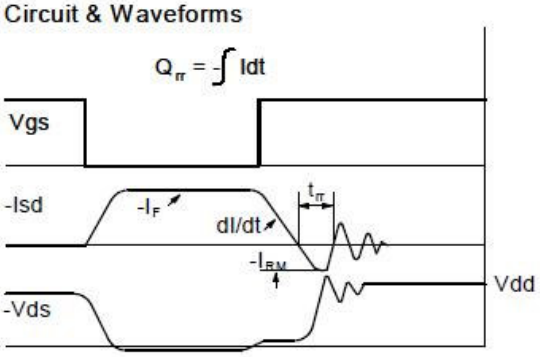
Resistive Switching Test Circuit & Waveforms





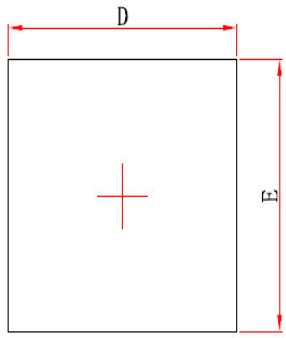
Diode Recovery Test Circuit & Waveforms



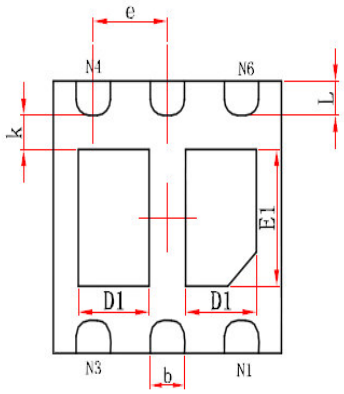


Package Dimension

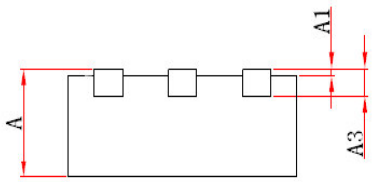
DFN2X2-6L



Top View



Bottom View



Side View

Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203 (REF)		0.008 (REF)	
D	1.924	2.076	0.076	0.082
E	1.924	2.076	0.076	0.082
D1	0.520	0.720	0.020	0.028
E1	0.900	1.100	0.035	0.043
k	0.200 (MIN)		0.008 (MIN)	
b	0.250	0.350	0.010	0.014
e	0.650 (TYP)		0.026 (TYP)	
L	0.174	0.326	0.007	0.013

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