GSMDC3801R

30V N-Channel MOSFETs

Product Description

These N-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.

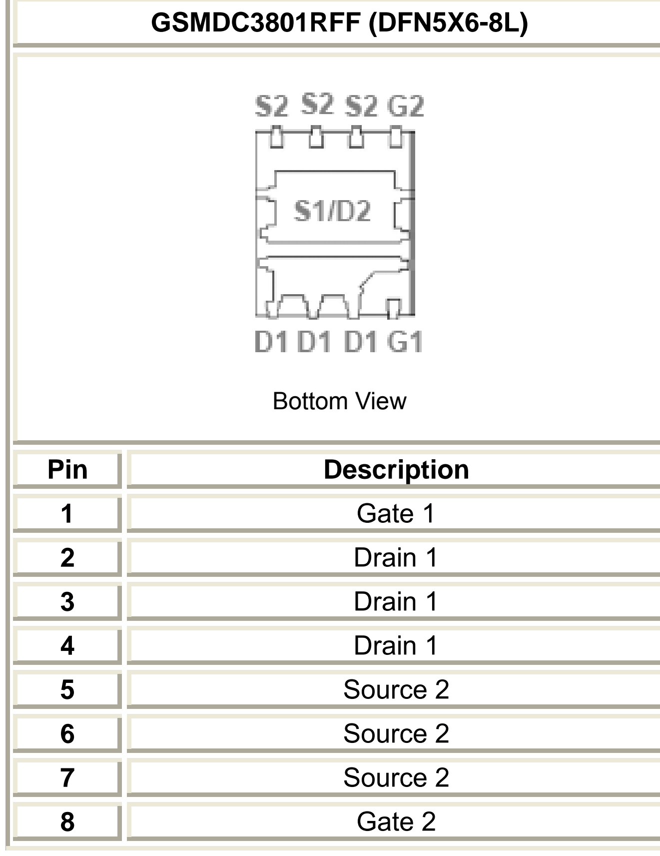
Features

- 30V, 55A, $R_{DS(ON)}$=9mΩ@V_{GS}=10V (Q1)
- 30V, 80A, $R_{DS(ON)}$=6mΩ@V_{GS}=10V (Q2)
- Improved dv/dt capability
- Fast switching
- 100% EAS guaranteed
- Green Device Available
- DFN5X6-8L package design

Applications

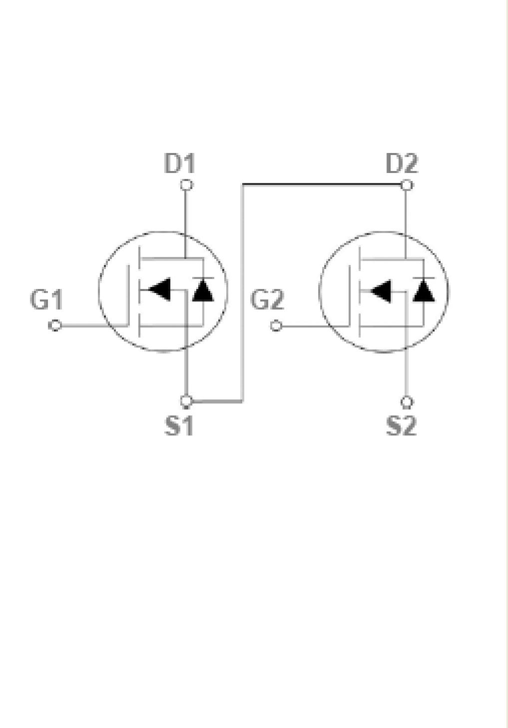
- MB / VGA / Vcore
- POL Buck Applications
- SMPS 2nd SR

Packages & Pin Assignments



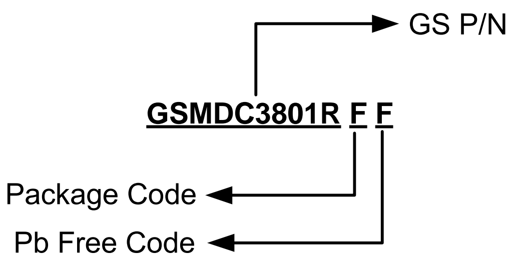
Bottom View

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



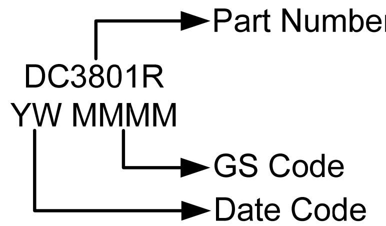
GSMDC3801R

Ordering Information



Part Number	Package
GSMDC3801RFF	DFN5X6-8L

Marking Information



Absolute Maximum Ratings

T_A=25ºC Unless otherwise noted

Symbol	Parameter		Q1	Q2	Unit
V_{DS}	Drain-Source Voltage		30	30	V
V_{GS}	Gate-Source Voltage		±20	±20	V
I_D	Continuous Drain Current, Chip/Package Limit	T_A=25℃	55/10	80/15	A
		T_A=100℃	35/6	51/9	
I_{DM}	Pulsed Drain Current, Chip/Package Limit		220/40	320/60	A
EAS	Single Pulse Avalanche Energy		45	88	mJ
IAS	Single Pulse Avalanche Current		30	42	A
P_D	Power Dissipation (T_A=25℃)		40	54	W
	Power Dissipation (Derate above 25℃)		0.32	0.43	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		62	62	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		3.1	2.3	℃/W

Electrical Characteristics (Q1)

T_A=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	30			V
△BV_{DSS}/△T_J	BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=1mA		0.04		V/℃
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1	1.6	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	V_{DS}=V_{GS},I_D=250uA		-4		mV/℃
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V,V_{GS}=0V			1	uA
		V_{DS}=24V,V_{GS}=0V, T_J=125℃			10	
I_S	Continuous Source Current	V_G=V_D=0V, Force Current			55	A
I_{SM}	Pulsed Source Current				220	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=10V,I_D=8A		7.5	9	mΩ
		V_{GS}=4.5V,I_D=5A		10	13	
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=8A		14		S
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=1A			1	V
EAS	Single Pulse Avalanche Energy	V_{DD}=25V,L=0.1mH, IAS=15A	12			mJ
Dynamic						
Q_g	Total Gate Charge	V_{DS}=15V,V_{GS}=4.5V, I_D=20A		7.5		nC
Q_{gs}	Gate-Source Charge			1.3		
Q_{gd}	Gate-Drain Charge			4.5		
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1MHz		750		pF
C_{oss}	Output Capacitance			150		
C_{rss}	Reverse Transfer Capacitance			110		
$t_{d(on)}$	Turn-On Time	V_{DD}=15V,I_D=15A, V_{GS}=10V,R_G=3.3Ω		4.8		ns
t_r				12.5		
$t_{d(off)}$	Turn-Off Time			27.6		
t_f				8.2		
R_g	Gate Resistance	V_{DS}=0V,V_{GS}=0V, f=1MHz		2.7		Ω

Electrical Characteristics (Q2)

T_A=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	30			V
△BV_{DSS}/△T_J	BV_{DSS} Temperature Coefficient	Reference to 25℃, I_D=1mA		0.04		V/℃
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1	1.6	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	V_{DS}=V_{GS},I_D=250uA		-4		mV/℃
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V,V_{GS}=0V			1	uA
		V_{DS}=24V,V_{GS}=0V, T_J=125℃			10	
I_S	Continuous Source Current	V_G=V_D=0V, Force Current			80	A
I_{SM}	Pulsed Source Current				320	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=10V,I_D=12A		4.8	6	mΩ
		V_{GS}=4.5V,I_D=8A		6.5	9	
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=10A		18		S
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=1A			1	V
EAS	Single Pulse Avalanche Energy	V_{DD}=25V,L=0.1mH, IAS=15A	20			mJ
Dynamic						
Q_g	Total Gate Charge	V_{DS}=15V,V_{GS}=4.5V, I_D=20A		11.1		nC
Q_{gs}	Gate-Source Charge			1.85		
Q_{gd}	Gate-Drain Charge			6.8		
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1MHz		1160		pF
C_{oss}	Output Capacitance			200		
C_{rss}	Reverse Transfer Capacitance			180		
$t_{d(on)}$	Turn-On Time	V_{DD}=15V,I_D=15A, V_{GS}=10V,R_G=3.3Ω		7.5		ns
t_r				14.5		
$t_{d(off)}$	Turn-Off Time			35.2		
t_f				9.6		
R_g	Gate Resistance	V_{DS}=0V,V_{GS}=0V, f=1MHz		2.5		Ω

Typical Performance Characteristics (Q1)

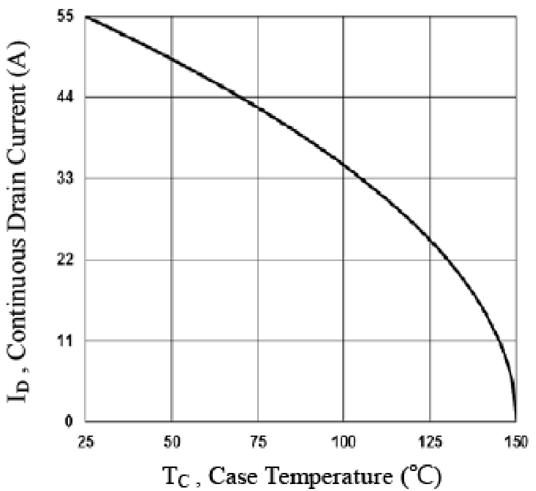


Fig.1 Q1 Continuous Drain Current vs. T_C

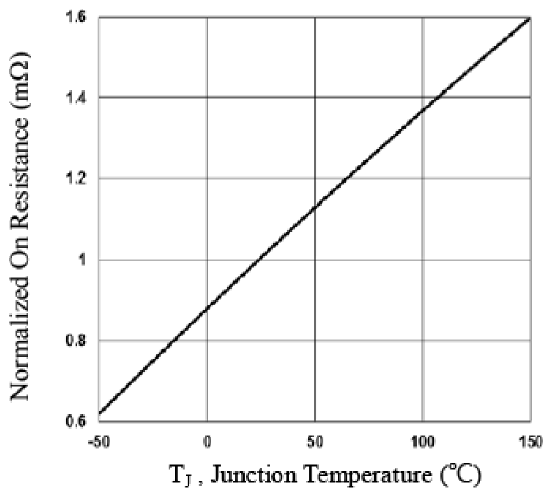


Fig.2 Q1 Normalized RDSON vs. T_J

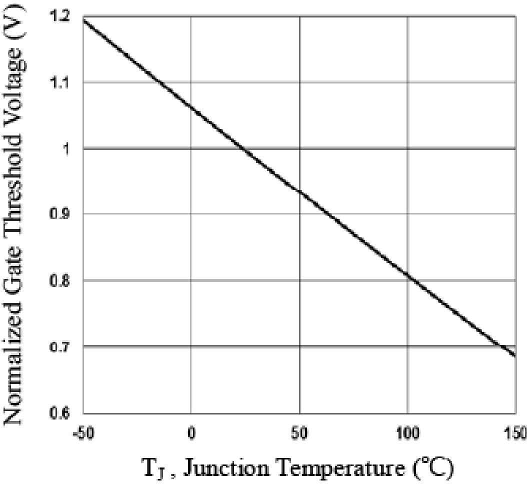


Fig.3 Q1 Normalized V_{th} vs. T_J

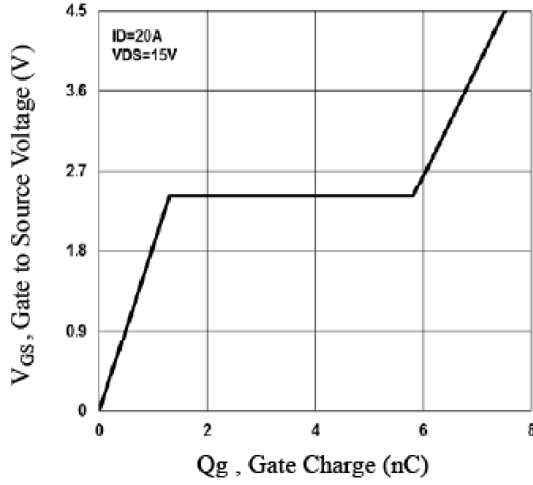


Fig.4 Q1 Gate Charge Waveform

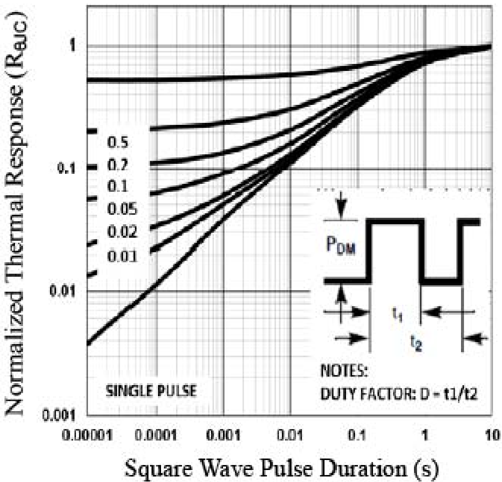


Fig.5 Q1 Normalized Transient Impedance

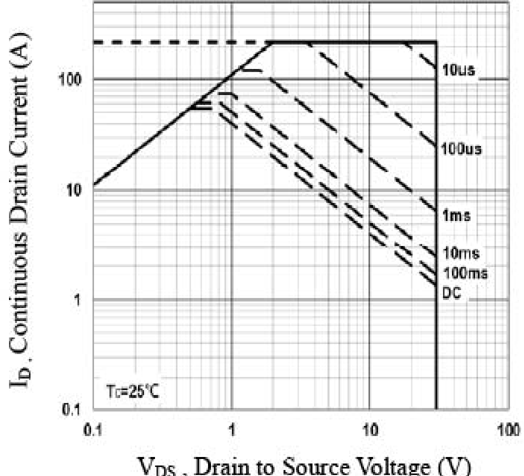


Fig.6 Q1 Maximum Safe Operation Area

Typical Performance Characteristics (Q2)

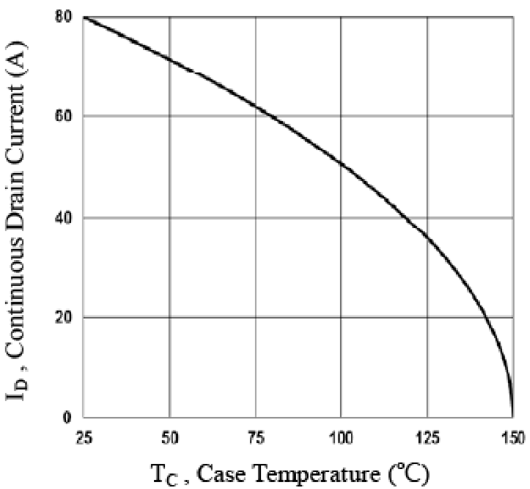


Fig.7 Q2 Continuous Drain Current vs. T_C

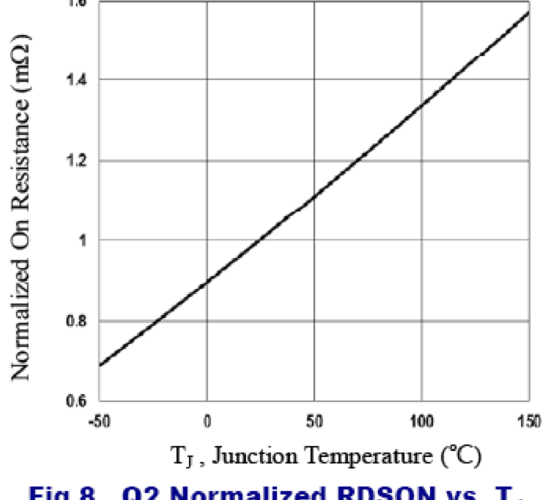


Fig.8 Q2 Normalized RDSON vs. T_J

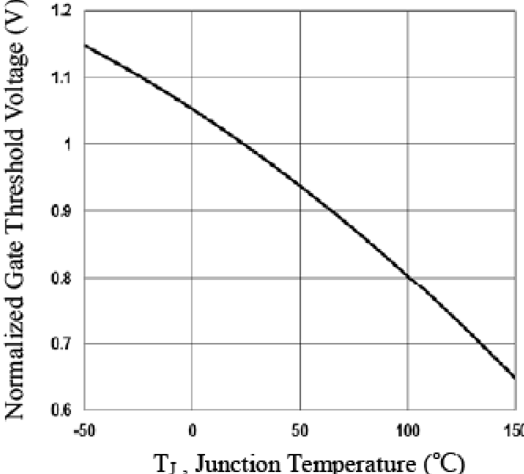


Fig.9 Q2 Normalized V_{th} vs. T_J

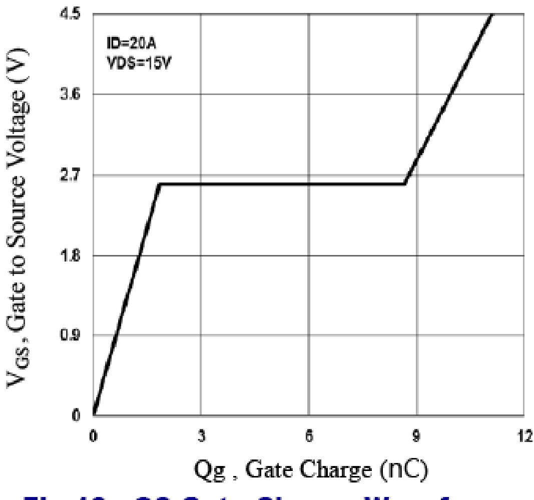


Fig.10 Q2 Gate Charge Waveform

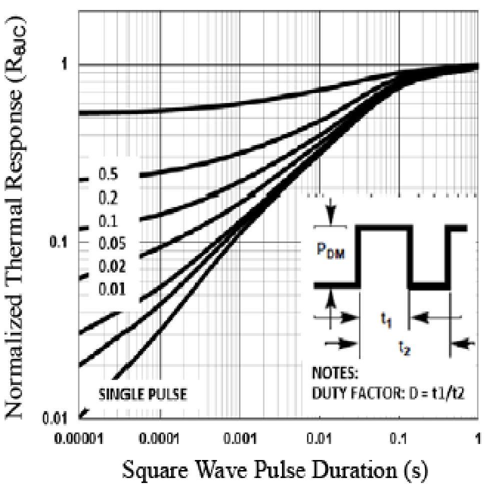


Fig.11 Q2 Normalized Transient Impedance

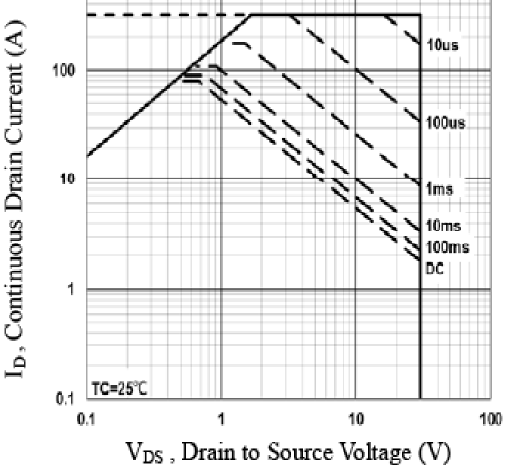
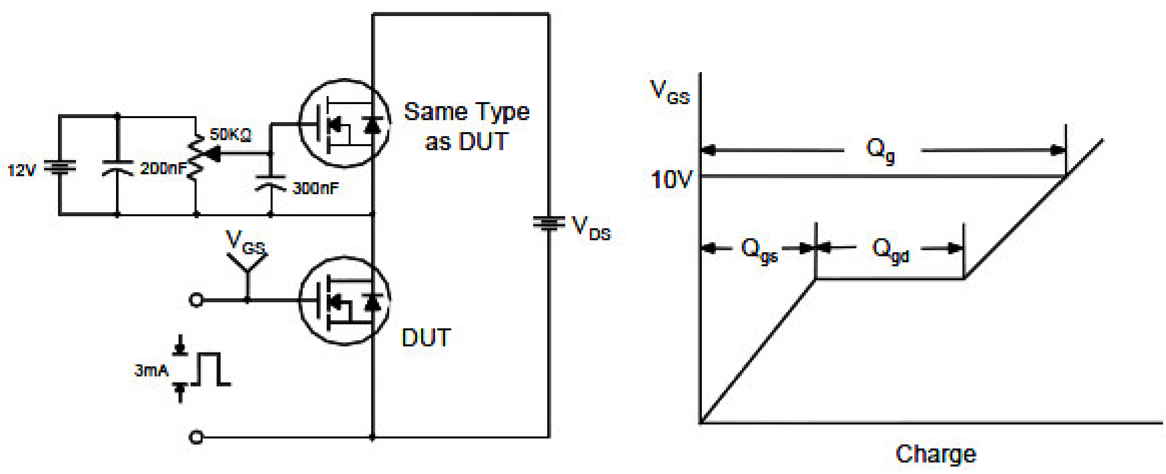


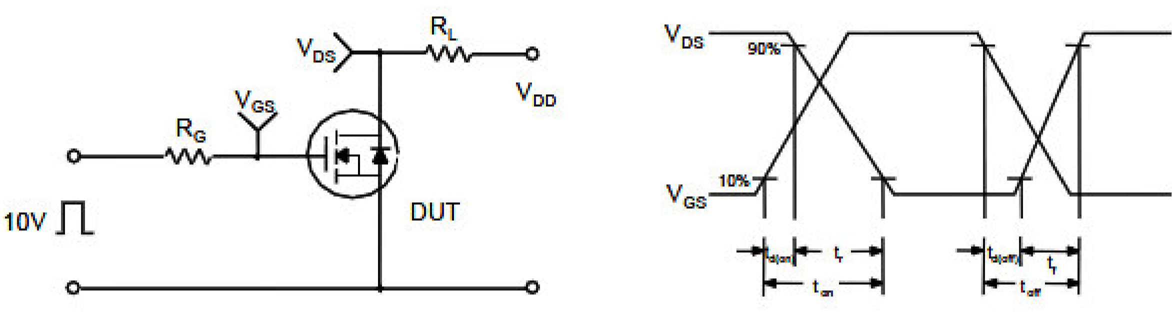
Fig.12 Q2 Maximum Safe Operation Area

Typical Performance Characteristics (Continue)

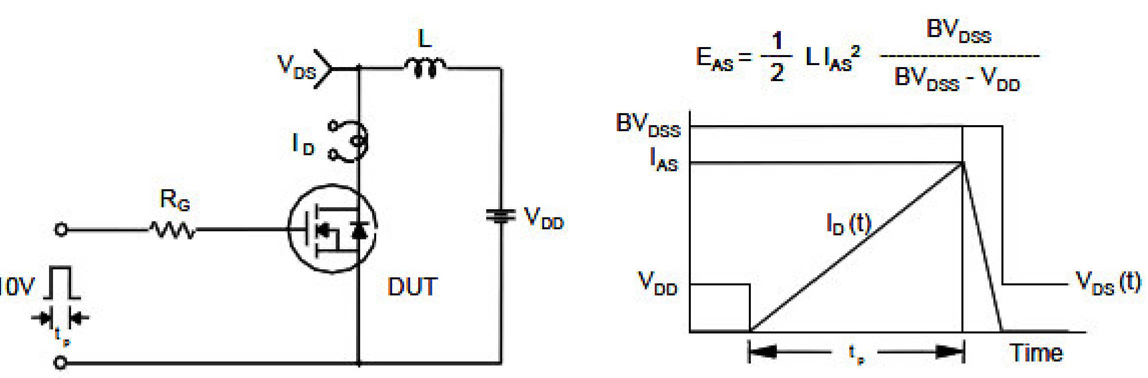
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

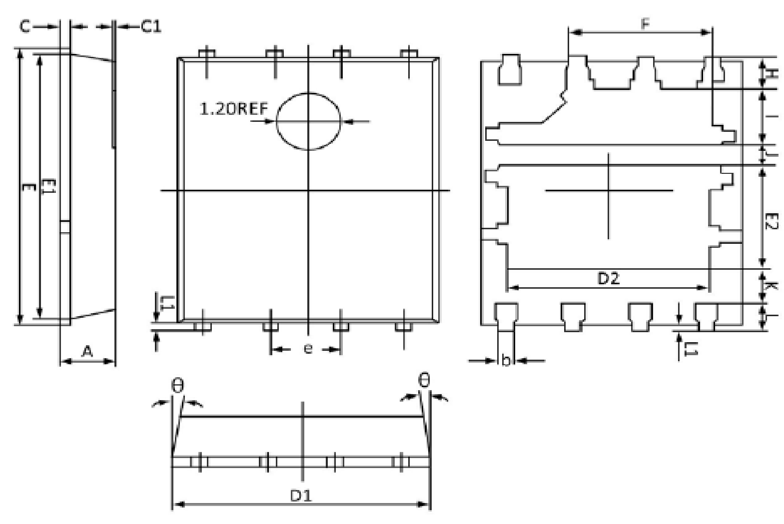


Unclamped Inductive Switching Test Circuit & Waveforms



Package Dimension

DFN5X6-8L



Dimensions					
Symbol	**Millimeters**		**Inches**		
	Min	**Max**	**Min**	**Max**	
A	0.900	1.100	0.036	0.043	
b	0.330	0.510	0.013	0.020	
C	0.200	0.300	0.008	0.011	
C1	0.040 REF		0.002 REF		
D1	4.800	5.000	0.189	0.196	
D2	3.610	3.960	0.143	0.155	
E	5.900	6.100	0.233	0.240	
E1	5.700	5.800	0.225	0.228	
E2	2.020	2.420	0.080	0.095	
e	1.270 BSC		0.050 BSC		
F	2.550	2.900	0.101	0.114	
H	0.610	0.810	0.025	0.031	
I	1.100	1.300	0.044	0.051	
J	0.400	0.600	0.016	0.023	
K	0.500	-	0.020	-	
L	0.510	0.710	0.020	0.027	
L1	0.060	0.200	0.003	0.007	
θ	0°	12°	0°	12°	

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CONTACT US

GS Headquarter	
Address	4F.,No.43-1,Lane11,Sec.6,Minquan E.Rd Neihu District Taipei City 114, Taiwan (R.O.C)
Tel	886-2-2657-9980
Fax	886-2-2657-3630
Email	sales_twn@gs-power.com

Shenzhen Branch(China)	
Address	1113 B Building, Happiness Washington, Baoan Nan Road, Luohu District, Shenzhen City, China
Tel	0755-22208941
Email	sales_cn@gs-power.com

RD Division	
Address	824 Bolton Drive Milpitas. CA. 95035
Tel	1-408-457-0587