

# FH1704GS6

## N-Channel Enhancement Mode Power MOSFET

### Description:

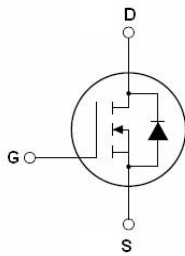
This N channel SGT MOSFET has been designed to very low on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, especially for high efficiency power management applications

### Applications:

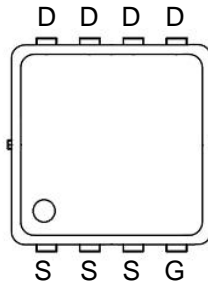
- DC-DC Converter
- Power Tools
- Load Switching

### Features:

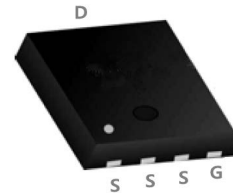
- $V_{DS} = 40V, I_D = 74A$
- $R_{DS(ON)}(Typ.) = 2.8m\Omega @ V_{GS} = 10V$
- $R_{DS(ON)}(Typ.) = 4.4m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low Rdson
- Excellent package for good heat dissipation
- FastSwitching



Schematic diagram



Marking and pin Assignment



PDFN3.3x3.3-8L top and bottom view

### Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

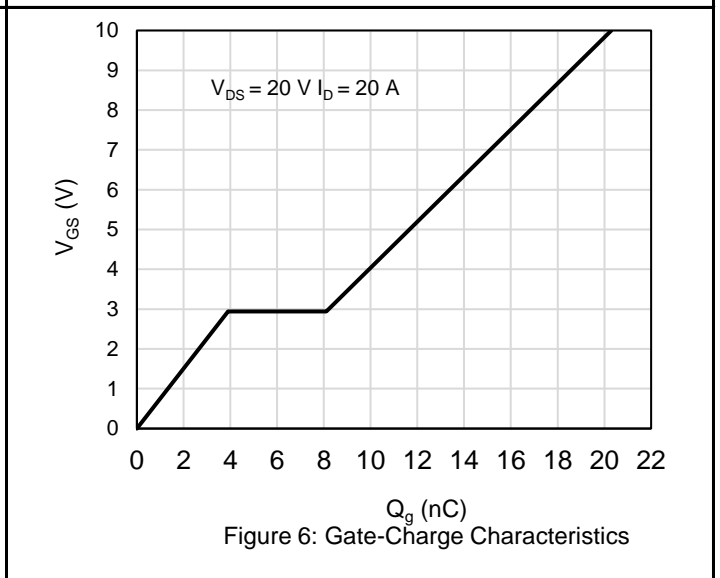
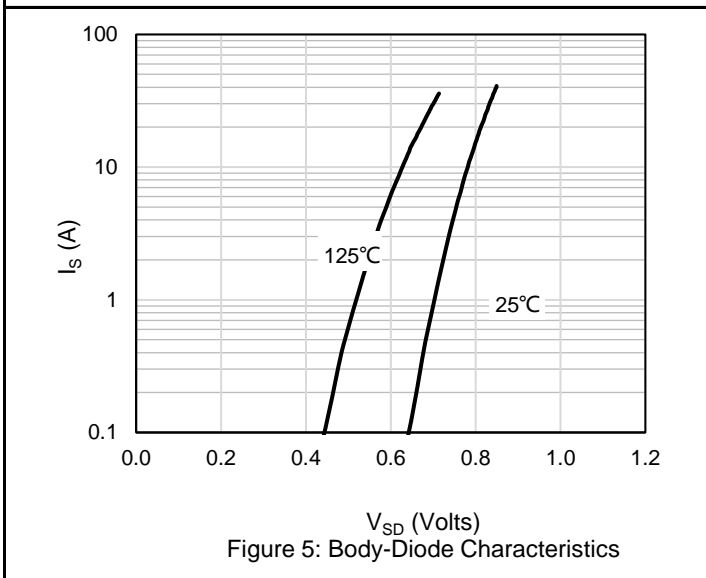
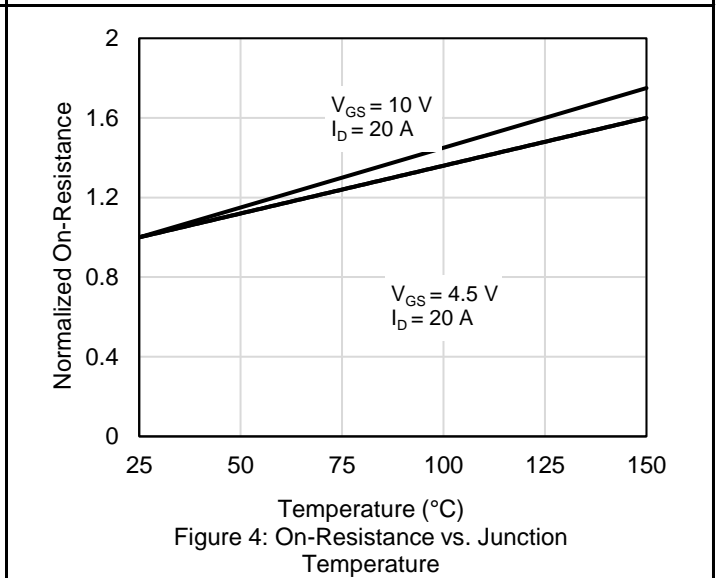
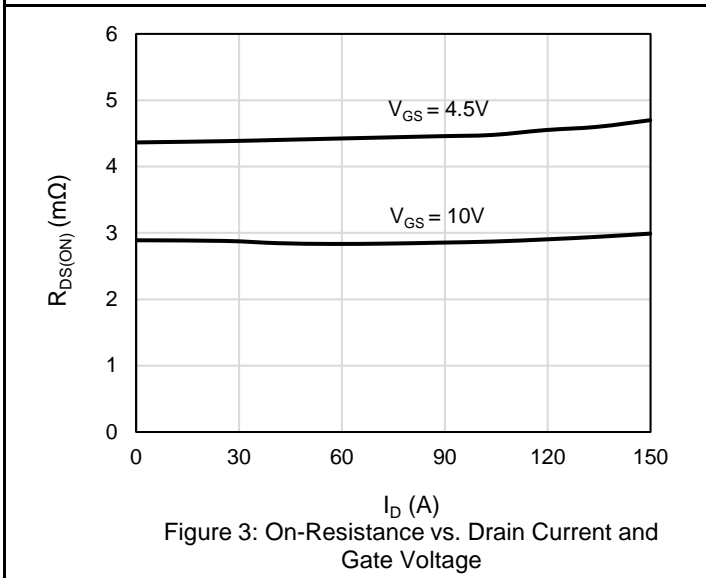
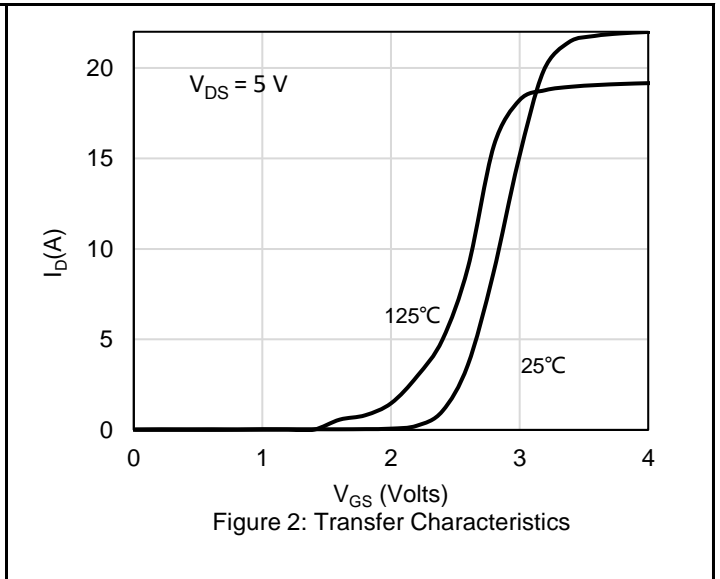
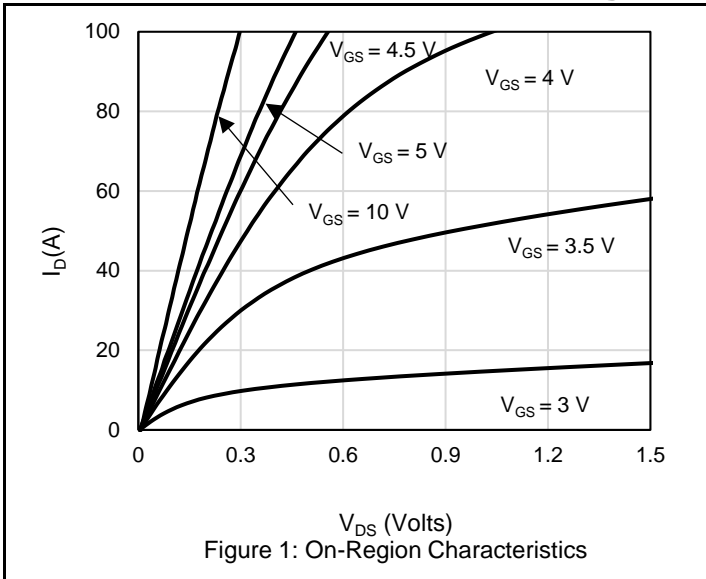
Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	40	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ C$ ) (Note 1)	74	A
	Drain Current - Continuous ( $T_C = 100^\circ C$ )	52	A
$I_{DM}$	Drain Current - Pulsed (Note 2)	222	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 3)	76	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ C$ )	40	W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	3.1	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady-State (Note 4)	58	$^\circ C/W$

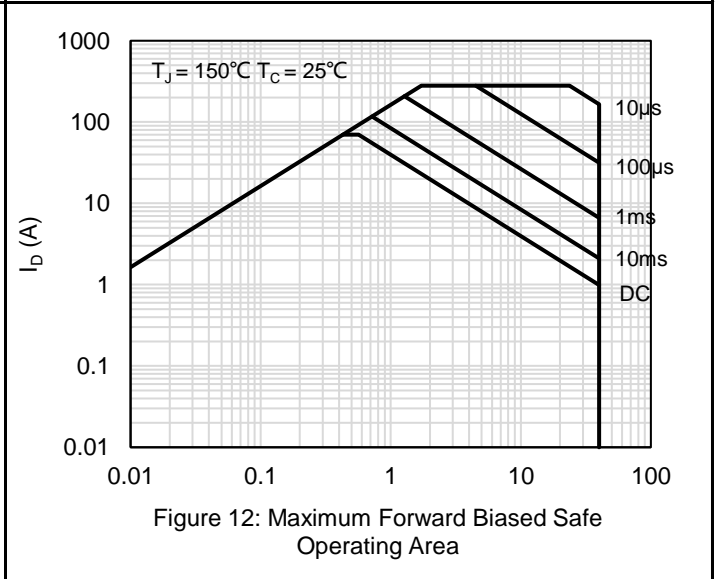
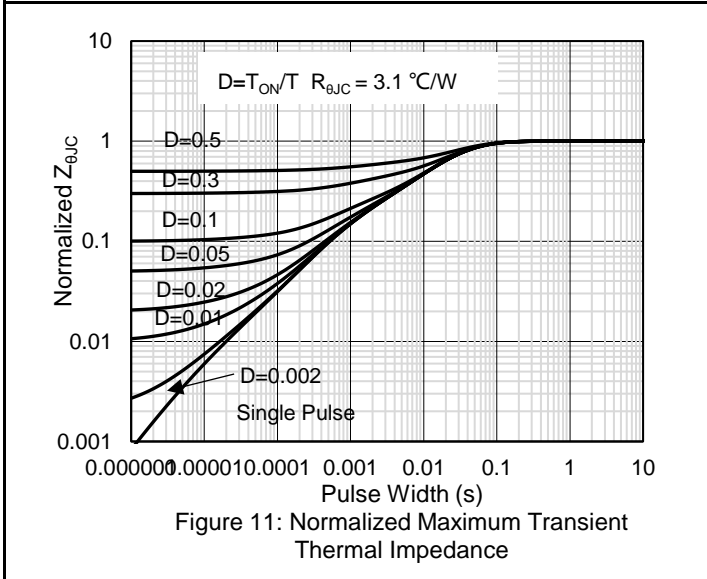
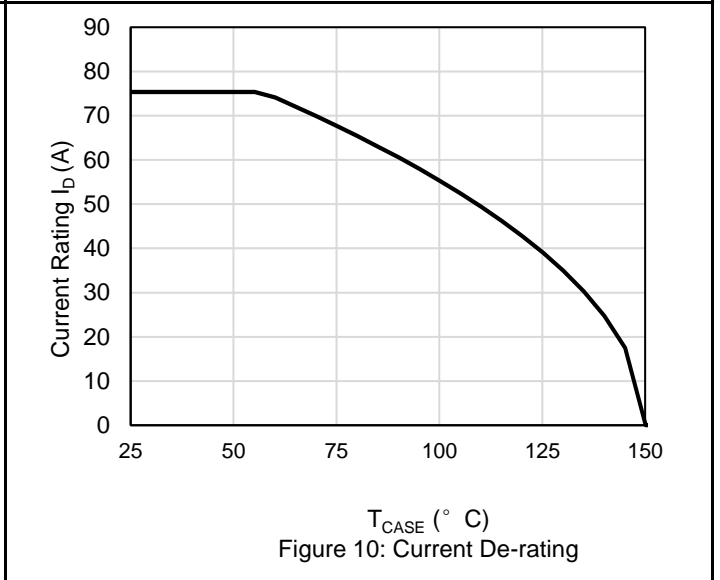
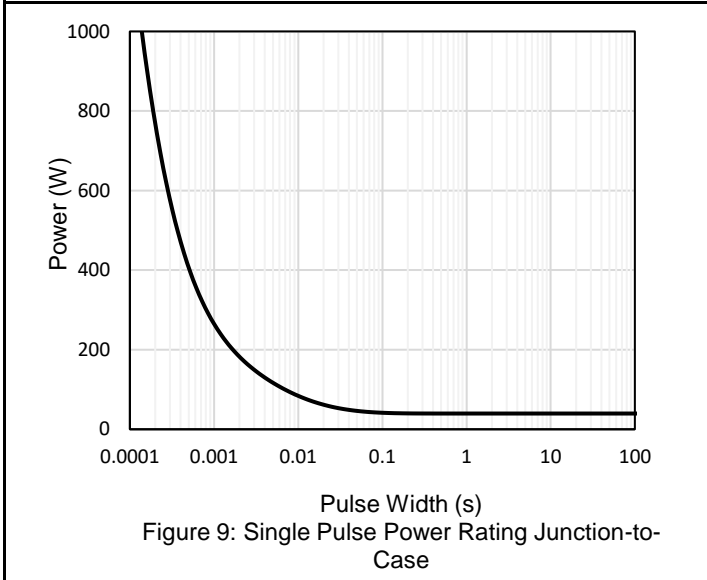
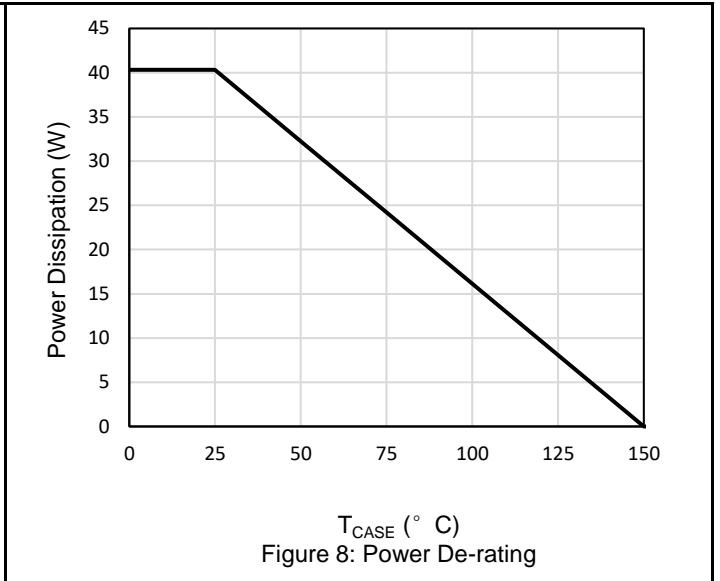
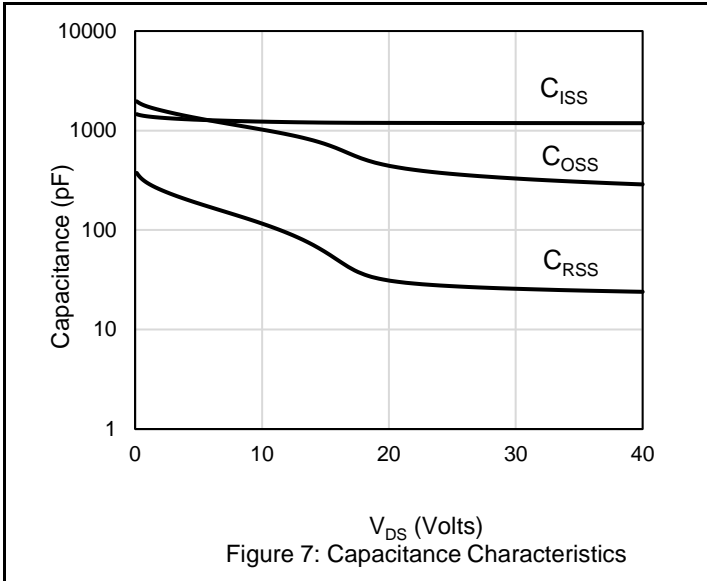
### Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3.  $L = 0.5\text{ mH}, V_{DD} = 20V, I_{AS} = 17.5\text{ A}, R_G = 50\ \Omega$ , Starting  $T_J = 25^\circ C$
4. Mount on minimum PCB layout

Electrical Characteristics (T <sub>J</sub> = 25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V,			1	μA
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 150°C			100	
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ± 20 V, 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 μA	1	1.5	2.5	V
R <sub>DS(ON)</sub>	Drain-Source on-state resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		2.8	3.5	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		4.4	6.2	
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, F = 1 MHz		1193		pF
C <sub>OSS</sub>	Output Capacitance			426		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			30		pF
R <sub>G</sub>	Gate Resistance	F = 1 MHz		8.4		Ω
<b>Switching Characteristics</b>						
T <sub>D(ON)</sub>	Turn On Delay Time	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6 Ω		7		nS
T <sub>R</sub>	Rise Time			6.5		nS
T <sub>D(OFF)</sub>	Turn Off Delay Time			29		nS
T <sub>F</sub>	Fall Time			13		nS
Q <sub>G</sub>	Total Gate Charge	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V		20.3		nC
Q <sub>GS</sub>	Gate-Source Charge			3.9		nC
Q <sub>GD</sub>	Gate-Drain Charge			4.2		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Body-Diode Forward Current			74		A
I <sub>SM</sub>	Maximum Pulsed Body-Diode Forward Current <sup>(NOTE 2)</sup>			222		A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1 A		0.7	1	V
T <sub>RR</sub>	Reverse recovery time	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 15 A, di/dt = 100 A/μs		30		ns
Q <sub>RR</sub>	Reverse recovery charge				17	

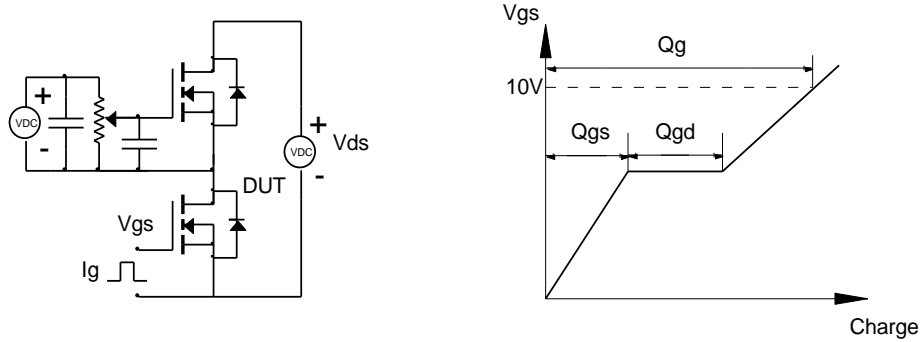
## Electrical Characteristics Diagrams



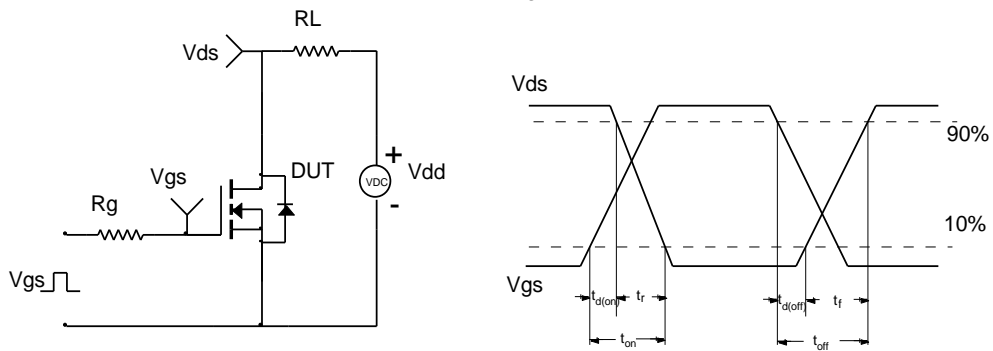


## Test Circuit and Waveform

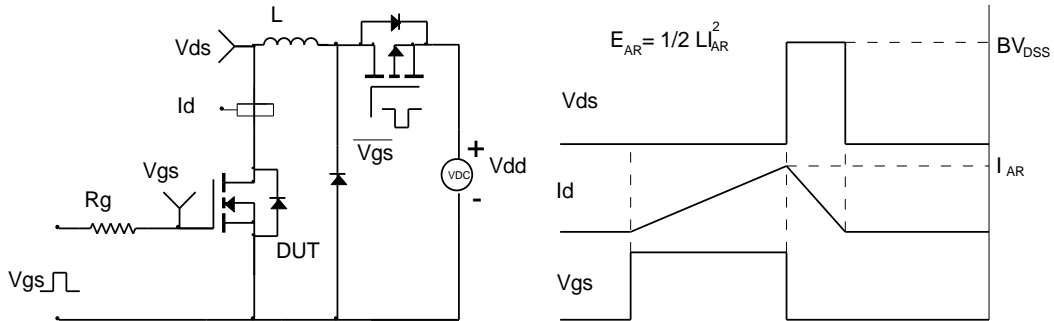
Gate Charge Test Circuit & Waveform



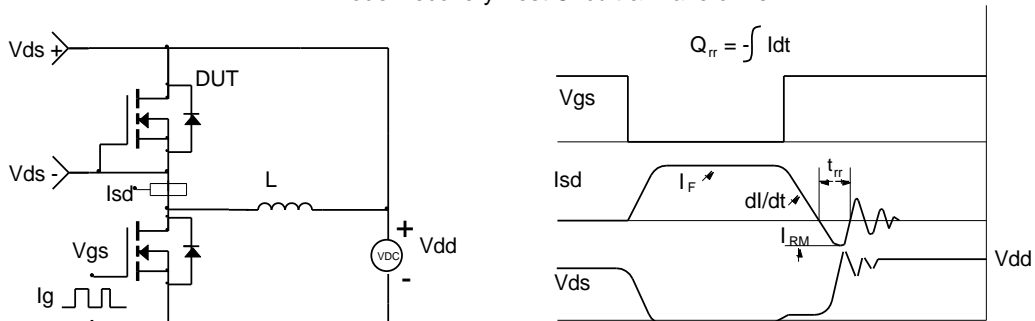
Resistive Switching Test Circuit & Waveforms



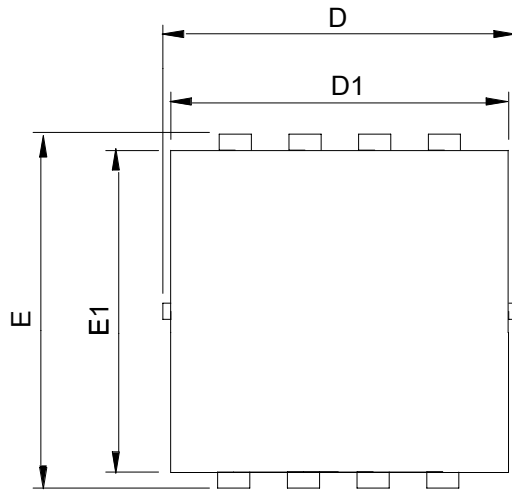
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



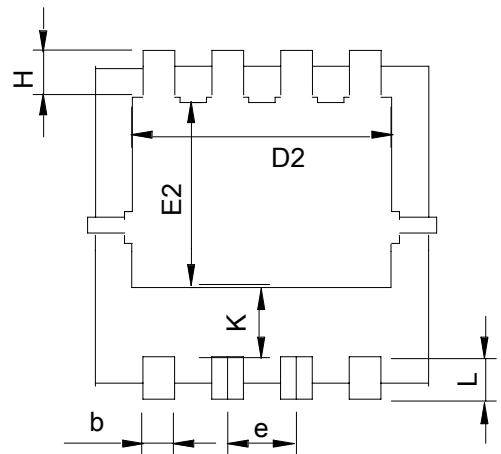
Diode Recovery Test Circuit & Waveforms



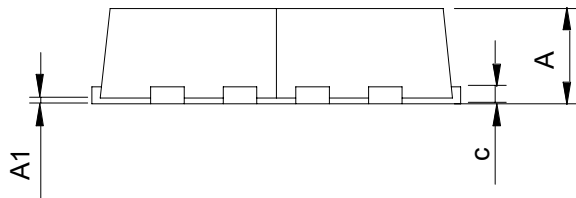
Package Information : PDFN3.3x3.3-8L



Top View



Bottom View



SYMBOL	PDFN3.3x3.3-8L			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022