

40V, 100A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

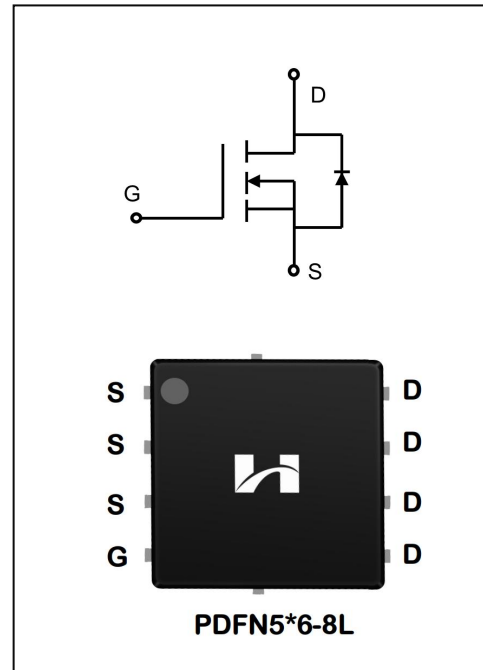
The SGM042R8T uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=40V, I_D=100A$
- ◆ $R_{DS(on)}$
 TYP: $2.6m\Omega @V_{GS}=10V$
 TYP: $3.8m\Omega @V_{GS}=4.5V$

Applications

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGM042R8T	PDFN5*6-8L	SGM042R8T	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	40	V
Gate-Source Voltage		V _{GS}	±20	V
Drain Current	T _C = 25°C	I _D	100	A
	T _C = 100°C		70	
Drain Current Pulsed(Note 1)		I _{DM}	400	A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	62	W
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	225	mJ
Operation Junction Temperature Range		T _J	-55~+150	°C
Storage Temperature Range		T _{stg}	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R _{θJC}	1.6	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	50	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDS}	V _{GS} =0V, I _D =250μA	40	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	--	--	1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	1.0	1.5	2.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =30A	--	2.6	2.8	mΩ
		V _{GS} =4.5V, I _D =20A	--	3.8	5.0	
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	1	1.5	5.0	Ω
Input Capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1.0MHZ	--	1972	--	pF
Output Capacitance	C _{oss}		--	411	--	
Reverse Transfer Capacitance	C _{rss}		--	22	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V, V _{DS} =10V R _G =3Ω; I _D =20A (Note 3.4)	--	6.4	--	ns
Turn-on Rise Time	t _r		--	27.8	--	
Turn-off Delay Time	t _{d(off)}		--	39.5	--	
Turn-off Fall Time	t _f		--	16.4	--	

Total Gate Charge	Q_g	$V_{DS}=20V, I_D=20A$ $V_{GS}=10V$ (Note 3.4)	--	28.7	--	nc
Gate-Source Charge	Q_{gs}		--	6.5	--	
Gate-Drain Charge	Q_{gd}		--	4.8	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	100	A
Pulsed Source Current	I_{SM}		--	--	400	
Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$	--	0.85	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=30A, V_R=10V,$ $dIF/dt=100A/\mu S$	--	25	--	ns
Reverse Recovery Charge	Q_{rr}		--	38	--	nC

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH, V_{DD}=20V, V_G=10V, R_G=25\Omega,$ starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

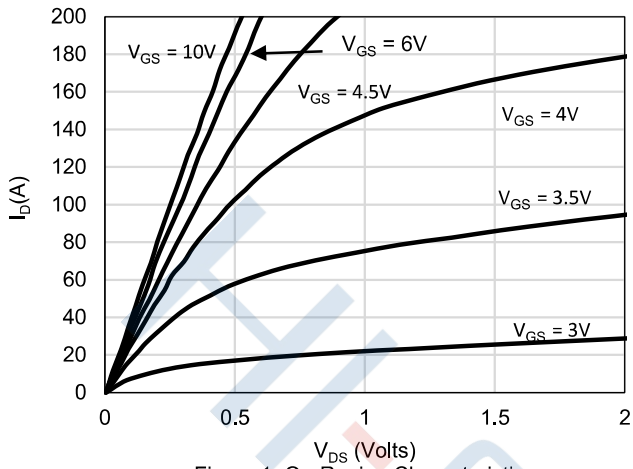


Figure 1: On-Region Characteristics

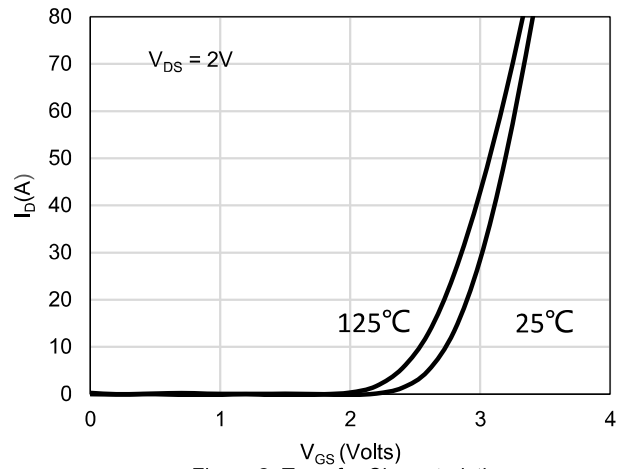


Figure 2: Transfer Characteristics

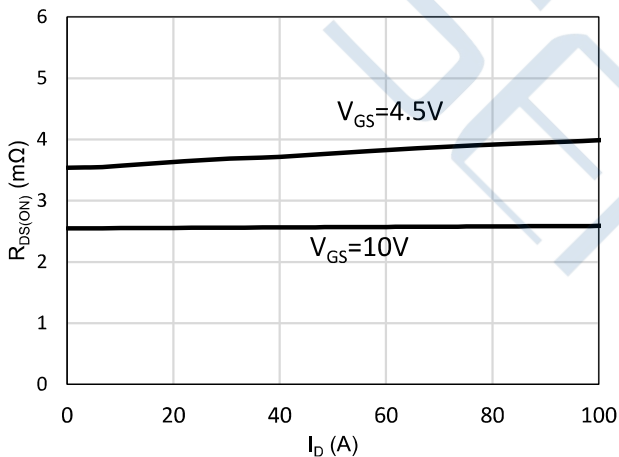


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

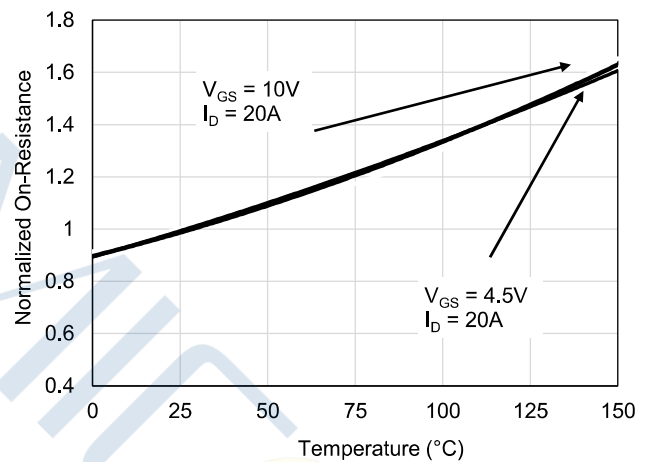


Figure 4: On-Resistance vs. Junction Temperature

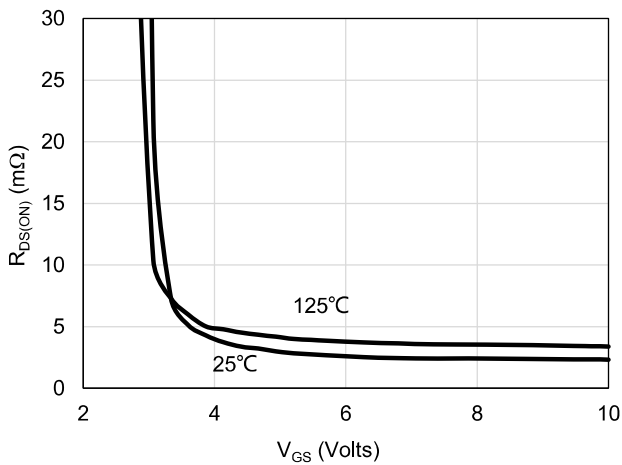


Figure 5: On-Resistance vs. Gate-Source Voltage

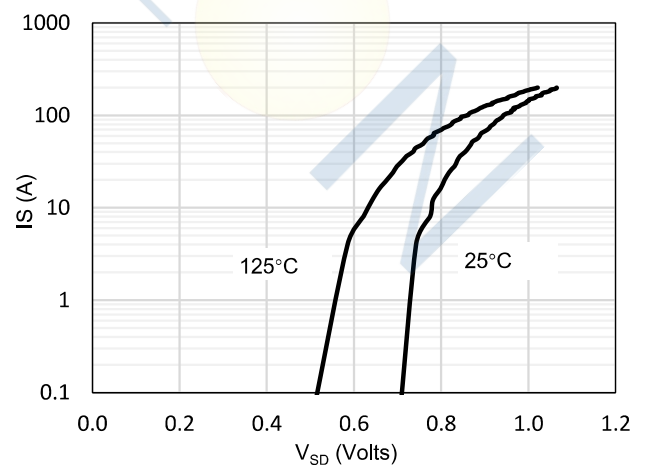


Figure 6: Body-Diode Characteristics

Typical Performance Characteristics

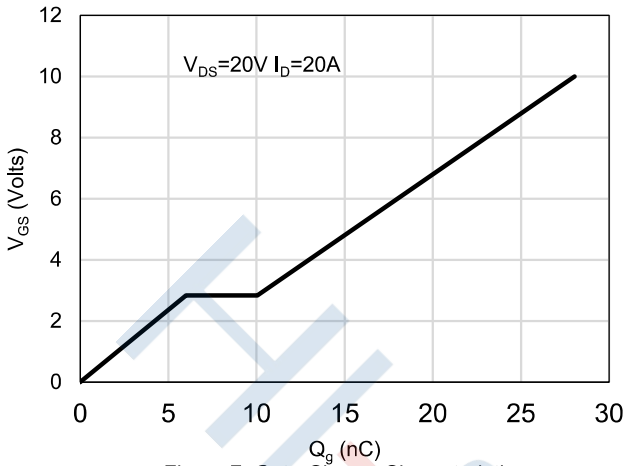


Figure 7: Gate-Charge Characteristics

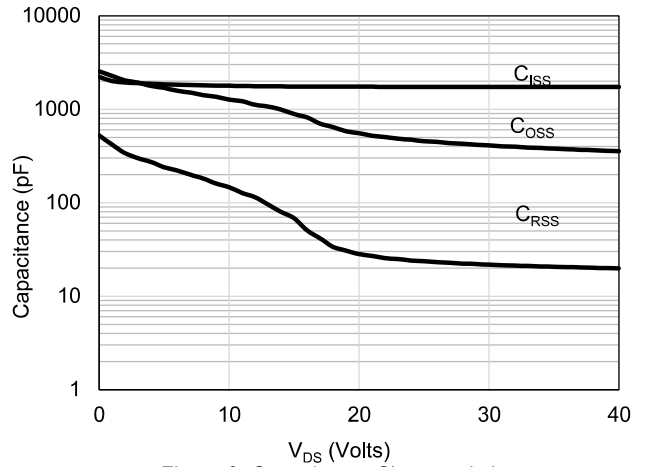


Figure 8: Capacitance Characteristics

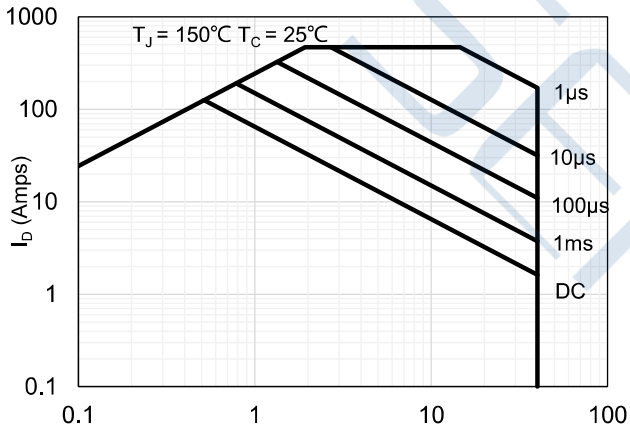


Figure 9: Maximum Forward Biased Safe Operating Area

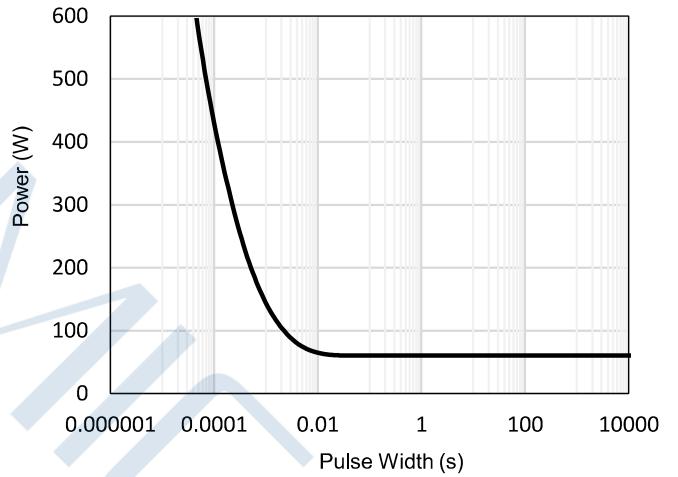


Figure 10: Single Pulse Power Rating Junction-to-Case

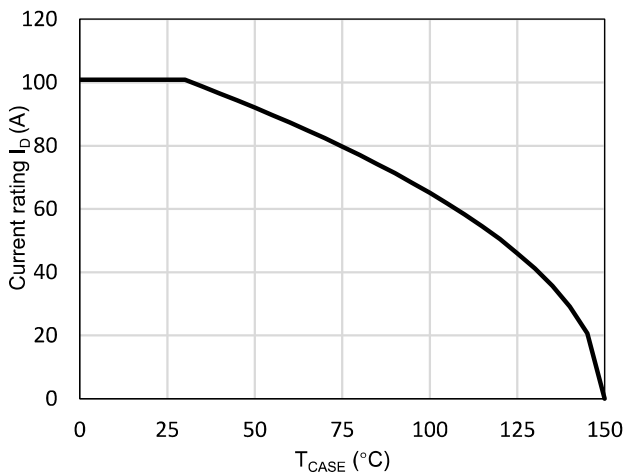


Figure 11: Current De-rating

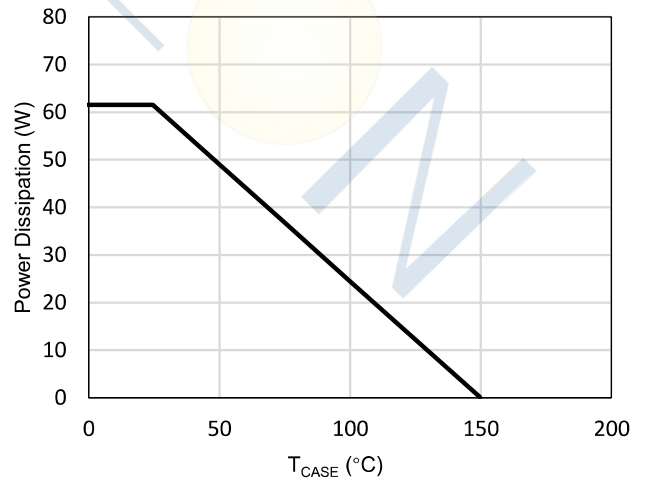
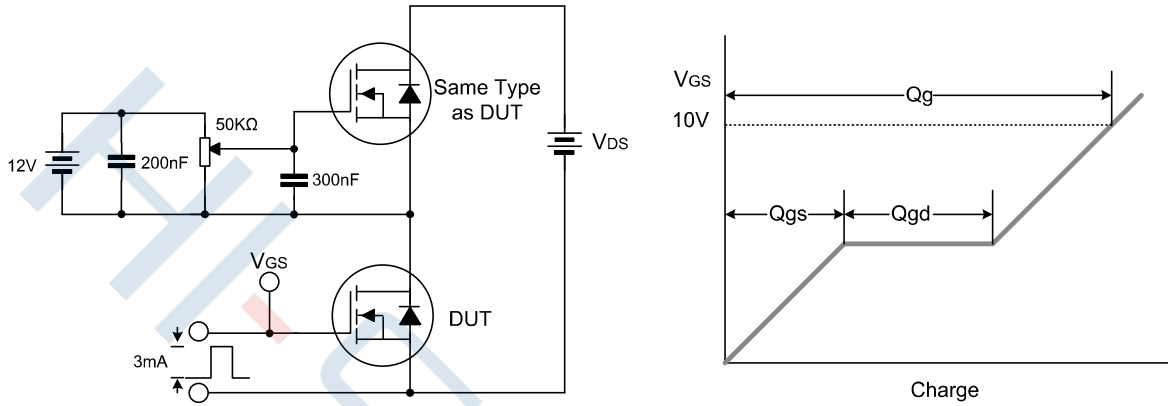


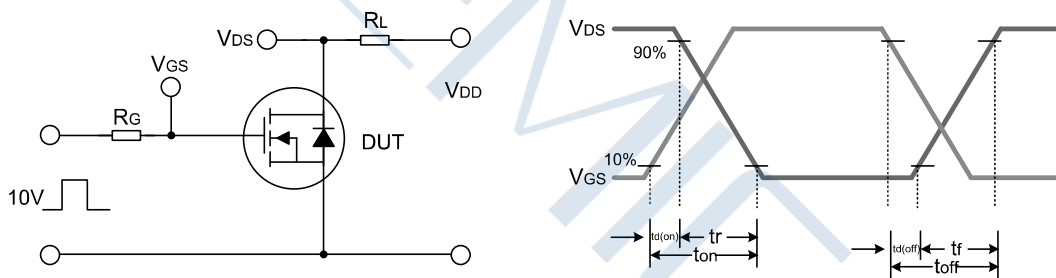
Figure 12: Power De-rating

Test Circuit

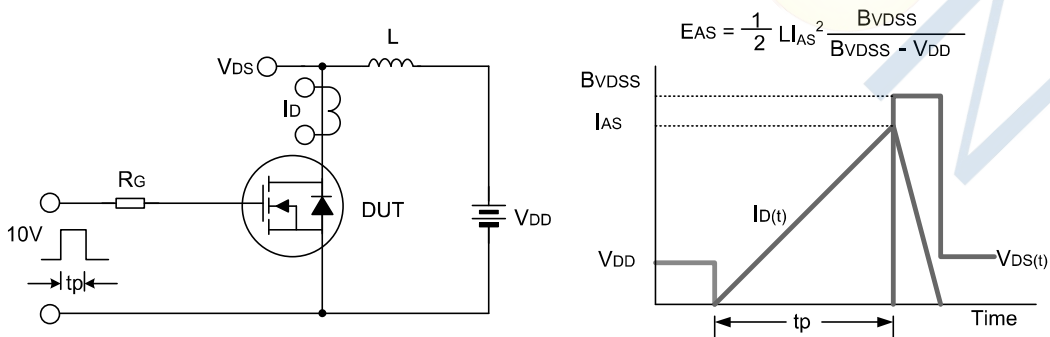
Gate Charge Test Circuit & Waveform



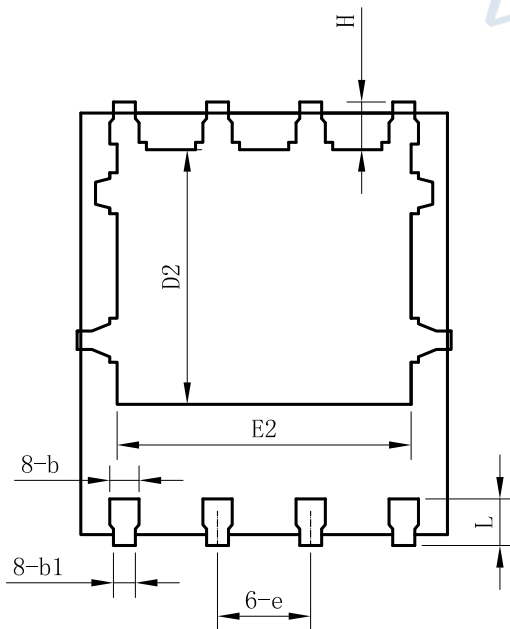
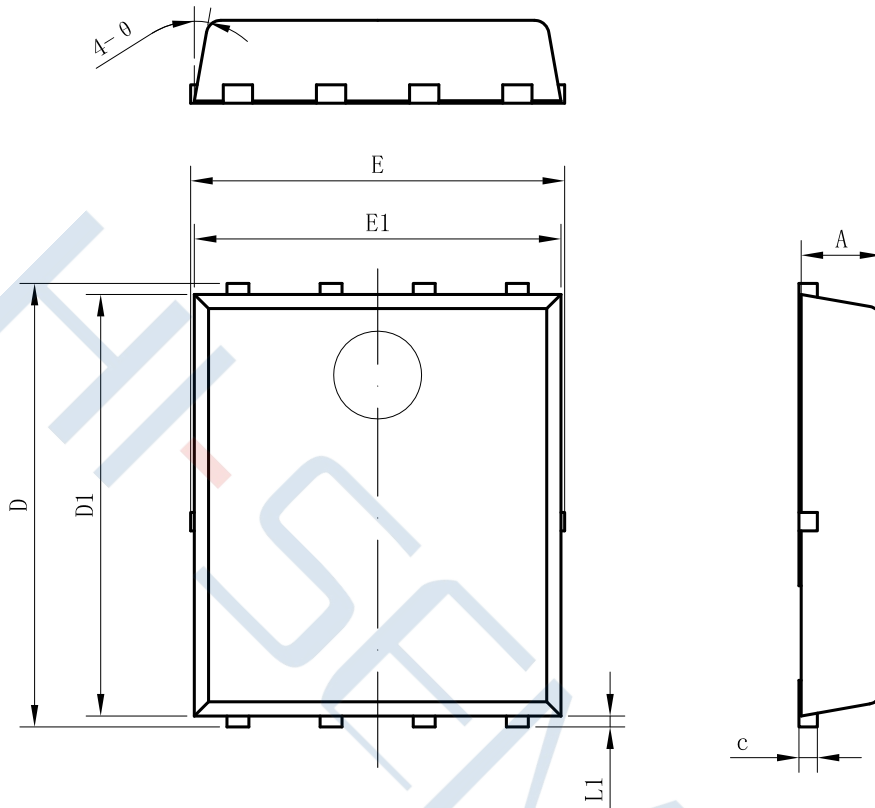
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of PDFN5*6-8L



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.0	1.1	1.2
b	0.35	0.4	0.45
b1		(0.3)	
c	0.2	0.25	0.35
D	5.9	6.05	6.2
D1	5.65	5.75	5.85
D2		(3.475)	
E			5.2
E1	4.9	5	5.1
E2		(4.01)	
e		1.27BSC	
H	0.5	0.65	0.75
L	0.51	0.635	0.75
L1		0.15	
θ		10°	

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