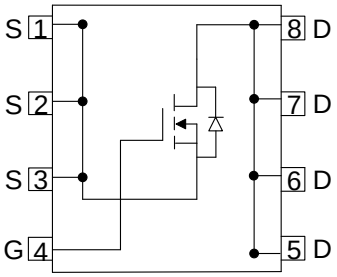
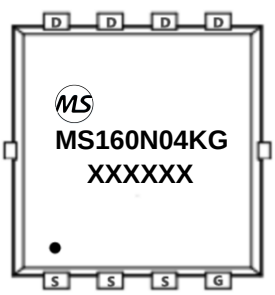
Description:

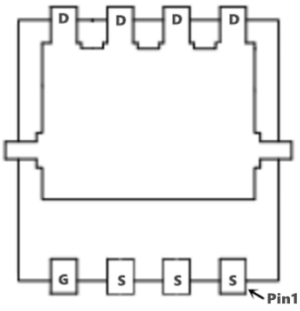
This N channel SGT MOSFET has been designed to ultra-low on-state resistance (R_{DSON}) and yet maintain superior switching performance, special for high efficiency power management applications.



Applications:

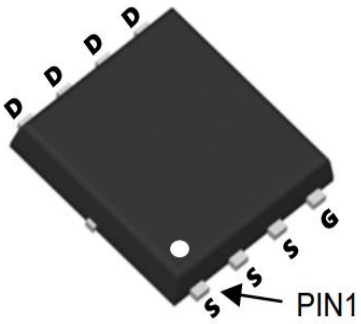
- DC-DC Conversion
- Power tools

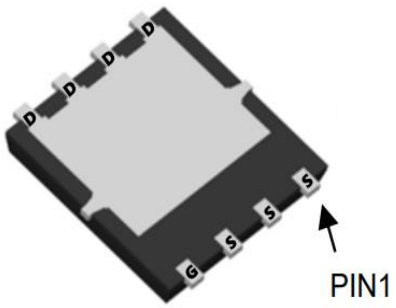




Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
R_{DSON}, max @VGS = 10 V	2.0	mΩ
I_D	176	A





Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
MS160N04KG	PDFN5*6-8L	MS160N04KG XXXXXX	13 inches Reel	5000PCS

Maximum Ratings(T_A=25℃ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	40	V
I_D	Drain Current - Continuous (T_C= 25°C)	176	A
	Drain Current -Continuous (T_C= 100°C)	110	A
I_{DM}	Drain Current - Pulsed (Note 1,2)	550	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	306	mJ
P_D	Power Dissipation (T_C = 25°C)	64	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	ºC

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case， Steady-State	1.94	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady State (Note 4)	60	°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 mH, V_{DD} = 15 V, I_{AS}=35 A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on 1 inch X 1 inch 2 oz FR-4 copper PCB
5. Pulse Test: Pulse width ≤ 300 us, Duty cycle ≤ 2%
6. Essentially independent of operating temperature

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	1	1.5	2.5	V
$R_{DS(On)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 20 A		1.2	2.0	mΩ
		V_{GS} = 4.5 V, I_D = 20 A		1.8	3.0	mΩ
G_{FS}	Forward Transconductance (NOTE 5)	V_{DS} = 2 V, I_D = 25 A		90		S
Dynamic Characteristics						
C_{ISS}	Input capacitance	V_{DS}=20 V, V_{GS}=0 V, F=1.0 MHZ		3900		pF
C_{OSS}	Output capacitance			1460		pF
C_{RSS}	Reverse transfer capacitance			32.9		pF
R_G	Gate resistance	F=1MHZ		4.5		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DS} = 20 V, I_D = 25 A, V_{GS} = 10 V, R_G = 4.7 Ω		11.8		ns
T_R	Rising Time			30.2		ns
$T_{D(OFF)}$	Turn Off Delay Time			78.7		ns
T_F	Fall Time			37.4		ns
Q_G	Total Gate Charge	V_{DS} = 20 V, I_D = 25 A, V_{GS} = 10 V		63.1		nC
Q_{GS}	Gate-Source Charge			10.4		nC
Q_{GD}	Gate-Drain Charge			12		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				176	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current(NOTE 1)				550	A
V_{SD}	Diode Forward Voltage	V_{GS}= 0 V, I_S = 50 A		0.84		V
T_{RR}	Reverse recovery time	I_S = 50 A, di/dt=100 A/μS		49.5		ns
Q_{RR}	Reverse recovery charge			46.8		nC

Electrical Characteristics Diagrams

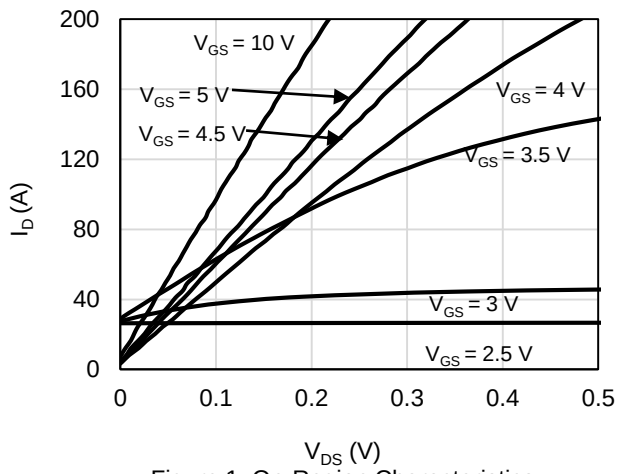


Figure 1: On-Region Characteristics

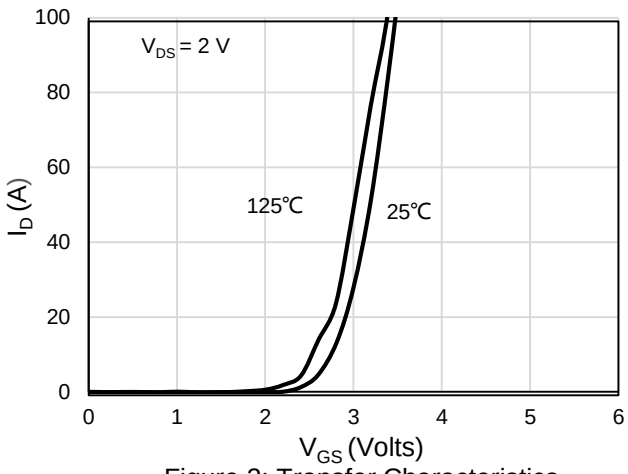


Figure 2: Transfer Characteristics

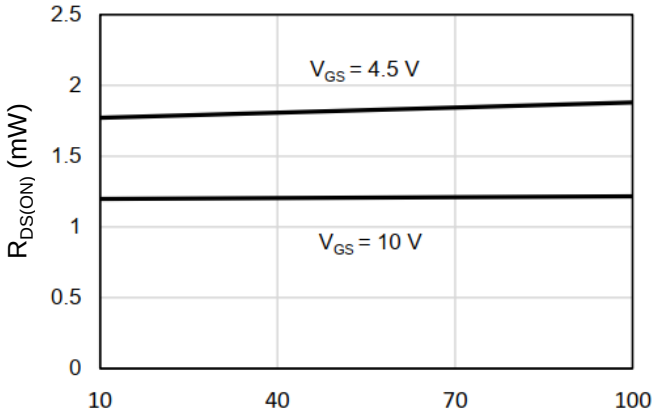


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

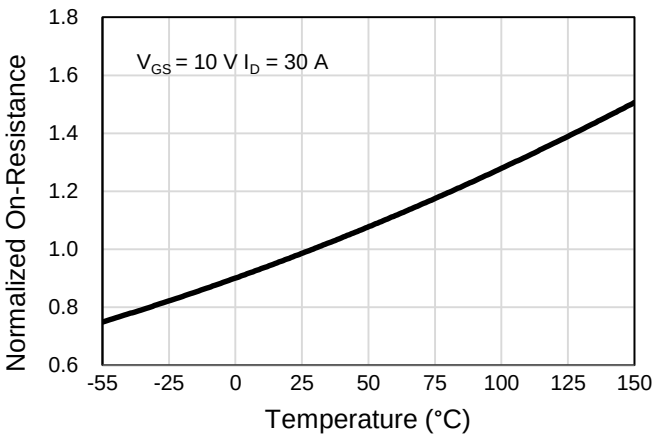


Figure 4: On-Resistance vs. Junction Temperature

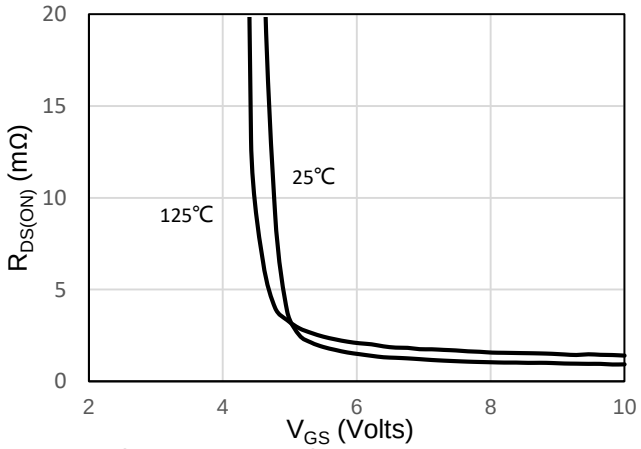


Figure 5: On-Resistance vs. Gate-Source Voltage

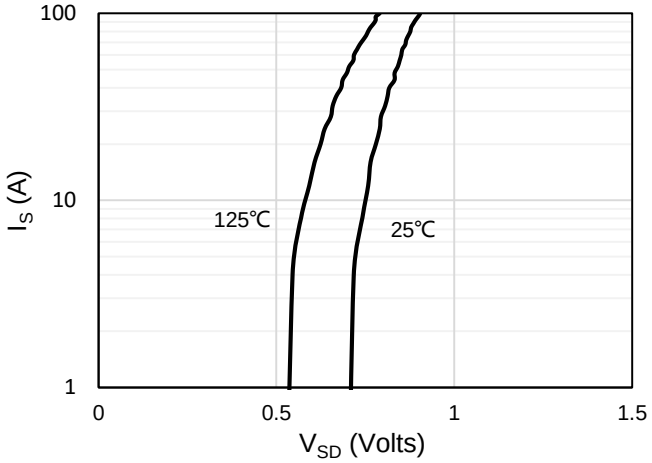


Figure 6: Body-Diode Characteristics

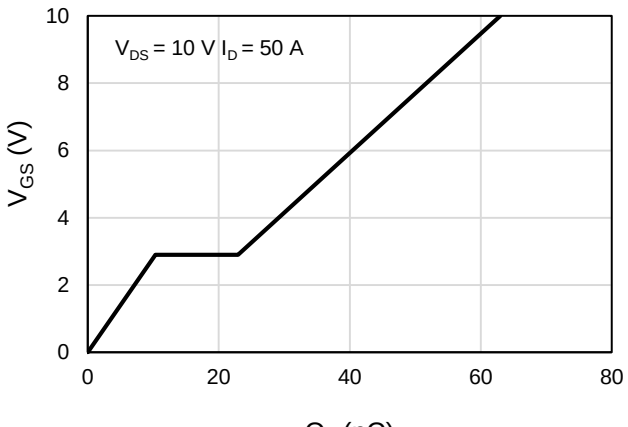


Figure 7: Gate-Charge Characteristics

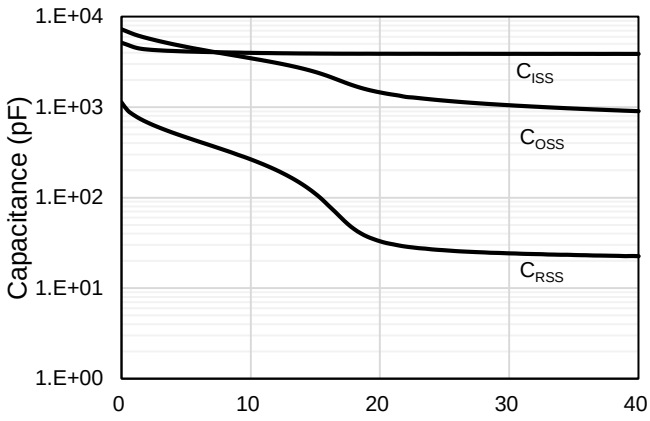


Figure 8: Capacitance Characteristics

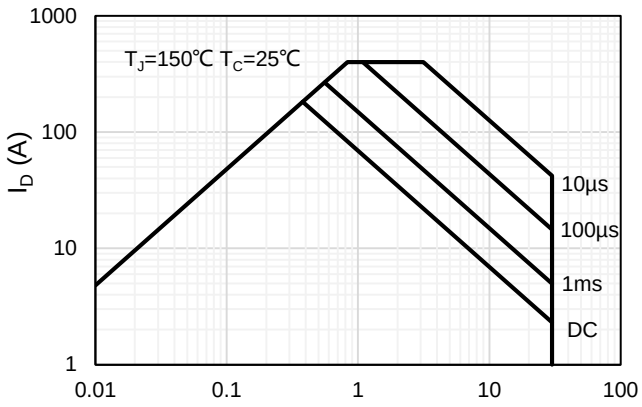


Figure 9: Maximum Forward Biased Safe Operating Area

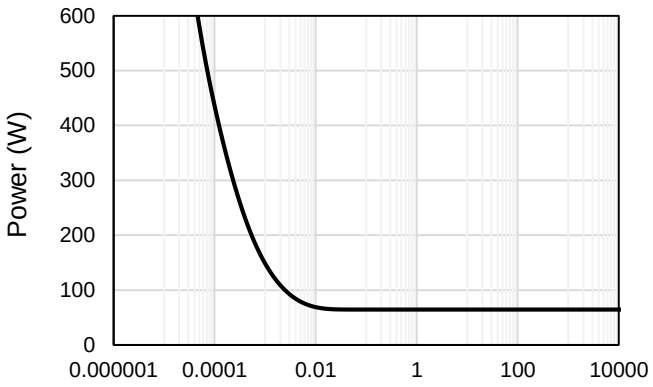


Figure 10: Single Pulse Power Rating Junction-to-Case

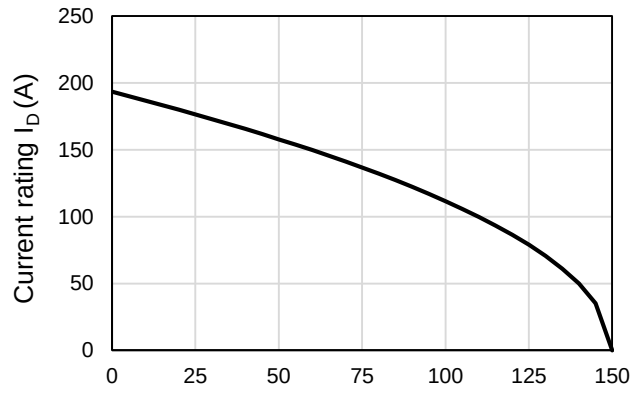


Figure 11: Current De-rating

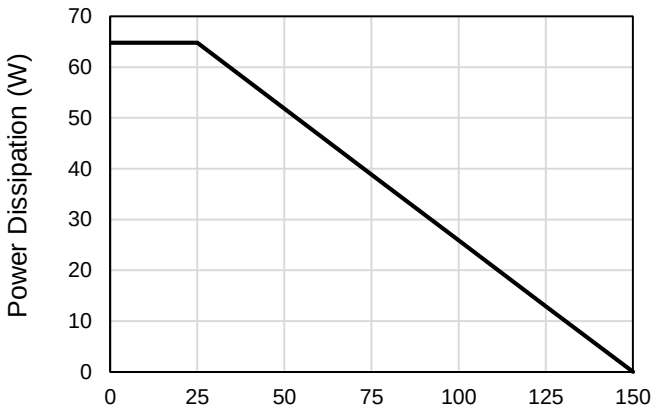


Figure 12: Power De-rating

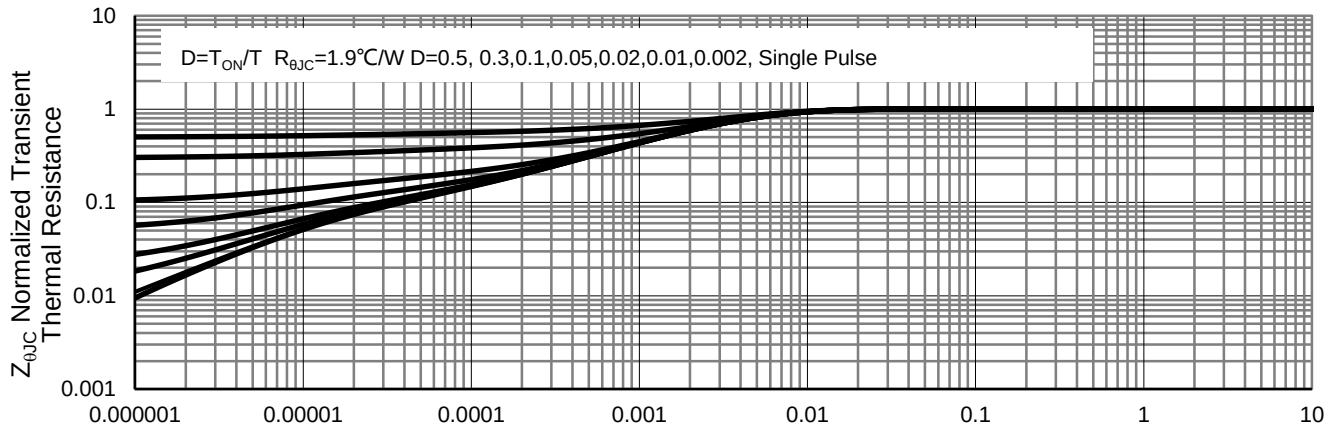
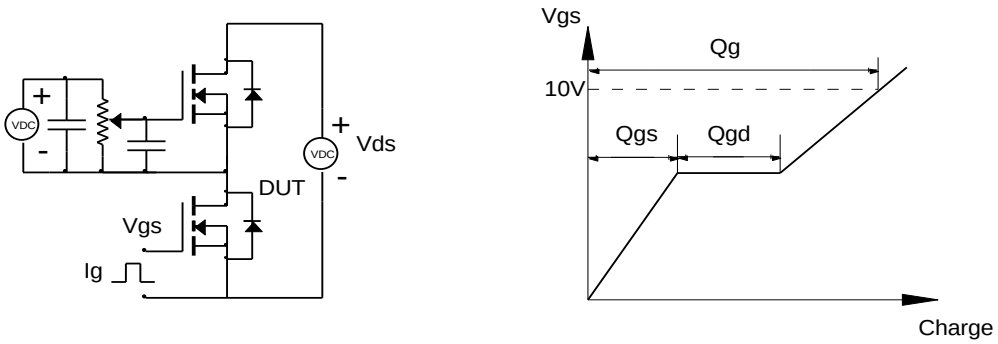


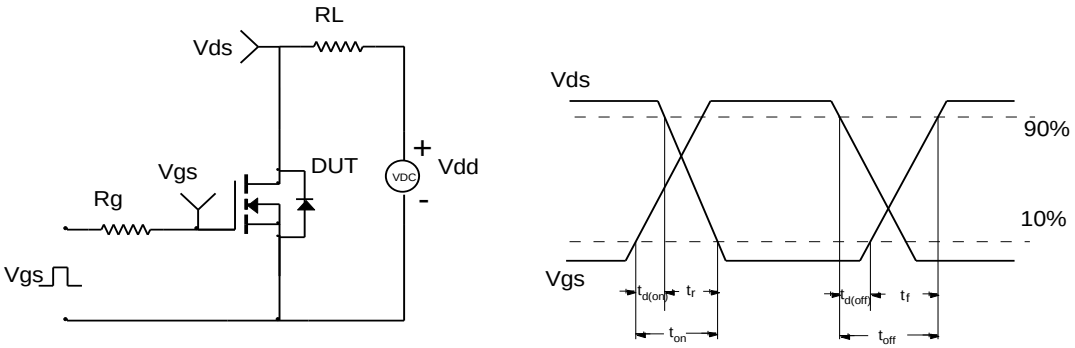
Figure 13: Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveform

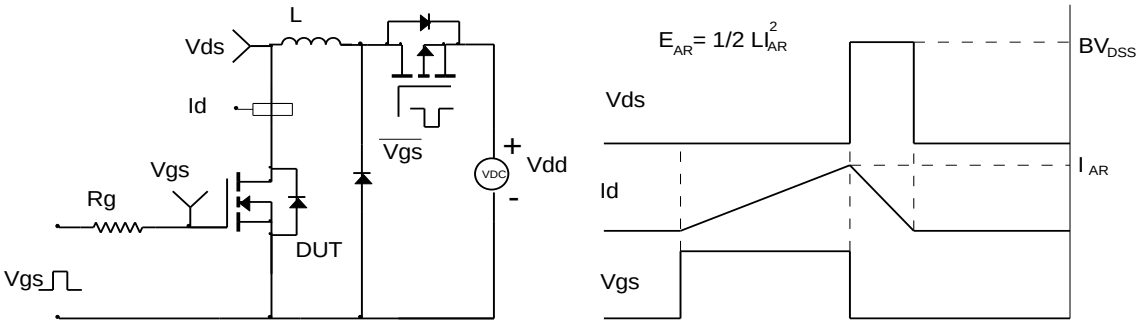
Gate Charge Test Circuit & Waveform



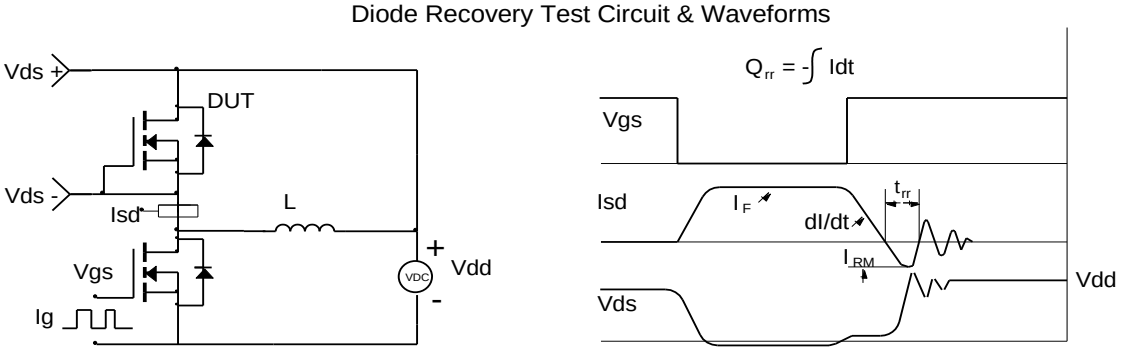
Resistive Switching Test Circuit & Waveforms



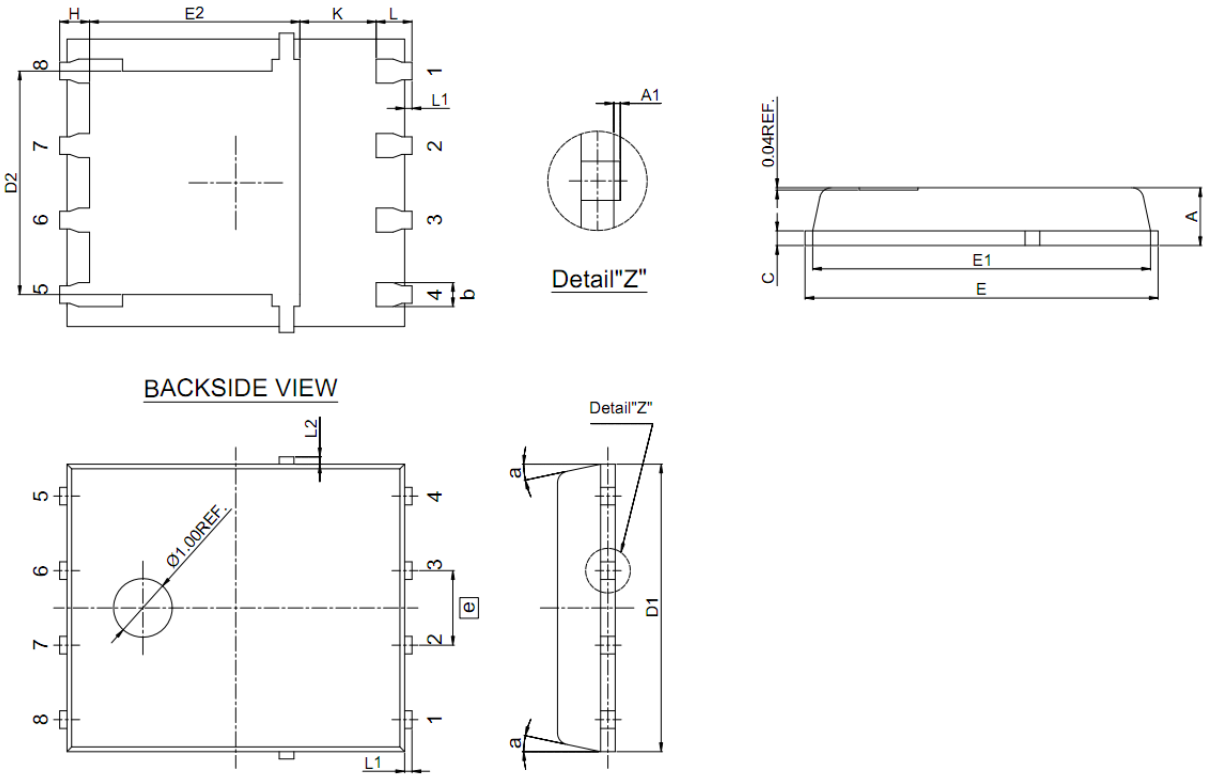
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines PDFN5*6-8L



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
L2	-	-	0.125
a	0°	-	12°

(Land Pattern
Only for Reference)