60V 3mohm N-channel SGT MOSFET
SI003N06NG2

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance and maintain superior switching performance, especial for high efficiency power management applications.

Features:

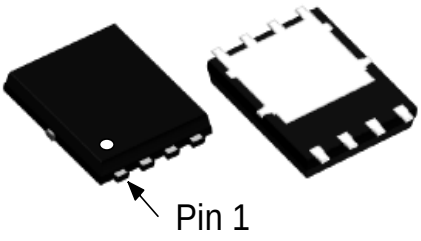
- Low $R_{DS(ON)}$
- RoHS compliant (Note 1)
- Halogen-free (Note 1)

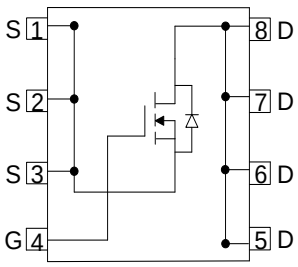
Applications:

- Battery Management System
- Motor Drivers
- DC-DC Converter

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	60	V
$R_{DSON,\ max}$ @V_{GS} = 10V	3.0	mΩ
I_D	120	A





Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
SI003N06NG2	DFN5X6	SI003N06NG2	Tape Reel	5000PCS

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	120	A
	Drain Current - Continuous (T_C = 100°C)	98	A
I_{DM}	Drain Current - Pulsed (Note 2)	400	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	196	mJ
P_D	Power Dissipation (T_C = 25°C)	62	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State (Note 4)	61	°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} = 30 V, I_{AS} = 28 A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

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	60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V,		0.5	1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V		10	100	nA
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	1	2	3	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 20 A		2.6	3.0	mΩ
		V_{GS} = 4.5 V, I_D = 15 A		4.1	5.2	mΩ
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 30 V, V_{GS} = 0 V, F = 1 MHz		3200	4200	pF
C_{OSS}	Output Capacitance			773	890	pF
C_{RSS}	Reverse Transfer Capacitance			50	78	pF
R_G	Gate Resistance	F = 1 MHz		1.1	1.95	Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 30 V , R_L = 1.5 Ω, V_{GS} = 10 V, R_G =6 Ω		18		nS
T_R	Rise Time			51.0		nS
$T_{D(OFF)}$	Turn Off Delay Time			61.0		nS
T_F	Fall Time			65.5		nS
Q_G	Total Gate Charge	V_{DD} = 30 V , I_D = 20 A, V_{GS} = 10 V		69.2		nC
Q_{GS}	Gate-Source Charge			11.7		nC
Q_{GD}	Gate-Drain Charge			17.8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current			120		A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)			400		A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 1 A		0.7	1	V
T_{RR}	Reverse recovery time	V_{DD} = 30 V, I_D = 20 A, di/dt = 100 A/μS		44.5		nS
Q_{RR}	Reverse recovery charge			52.0		nC
I_{RRM}	Peak Reverse Recovery Current			2		A

Electrical Characteristics Diagrams

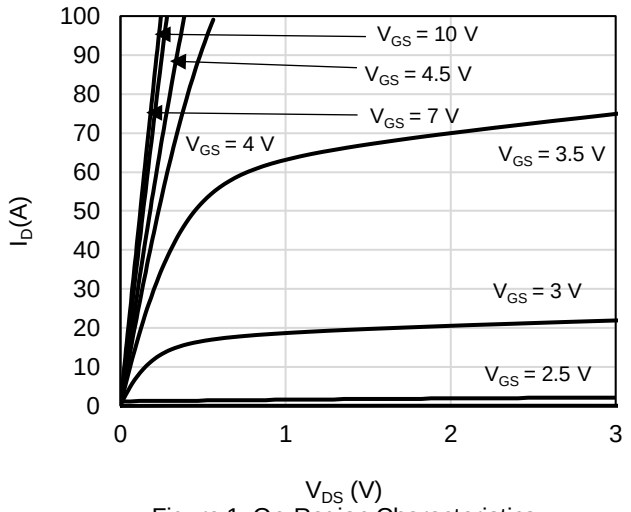


Figure 1: On-Region Characteristics

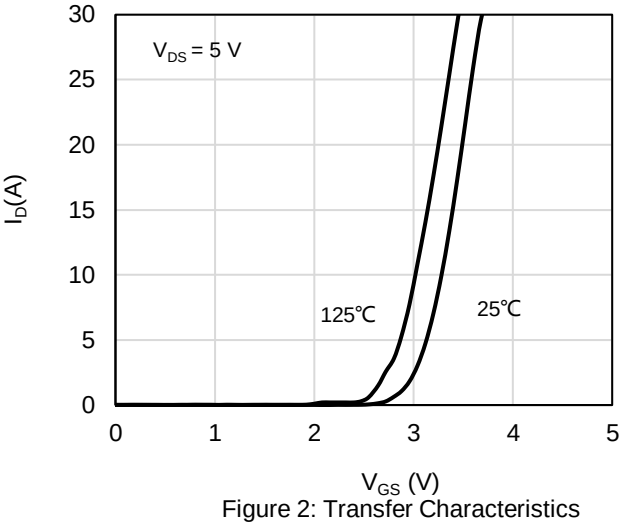


Figure 2: Transfer Characteristics

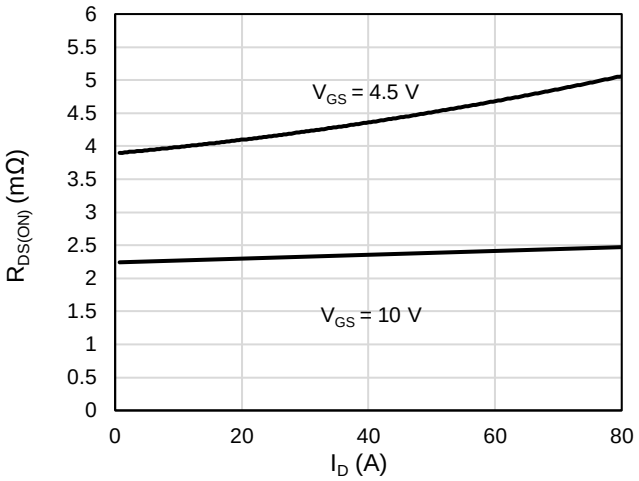


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

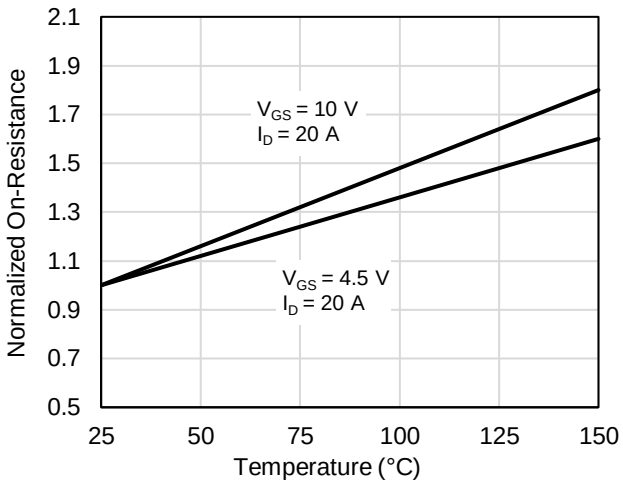


Figure 4: On-Resistance vs. Junction Temperature

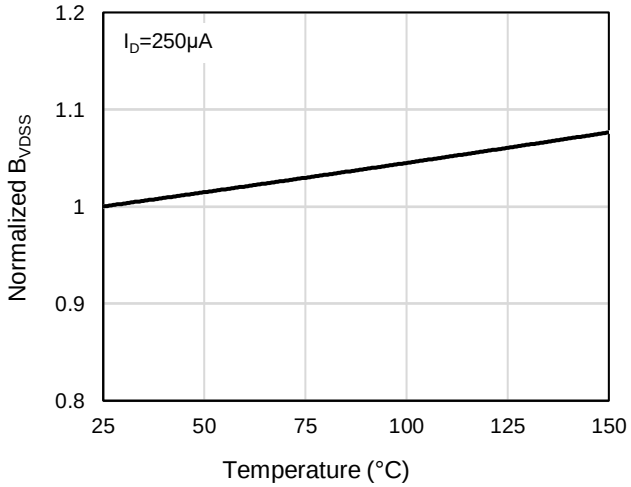


Figure 5: Breakdown Voltage vs. Junction Temperature

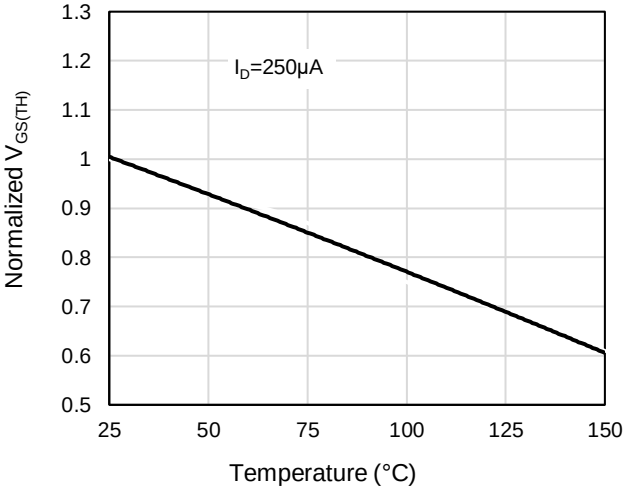


Figure 6: Threshold Voltage vs. Junction Temperature

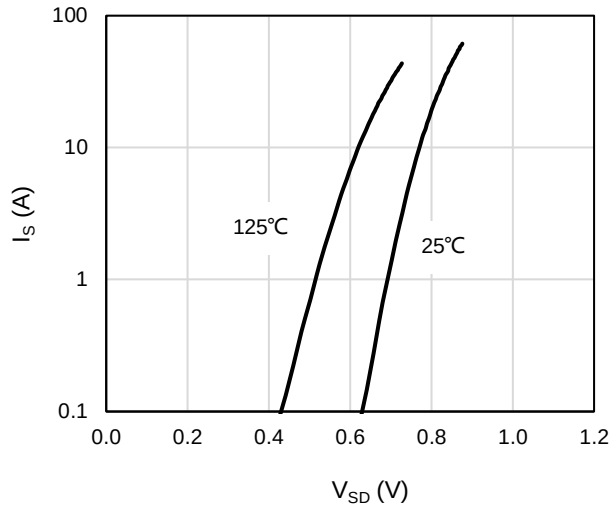


Figure 7: Body-Diode Characteristics

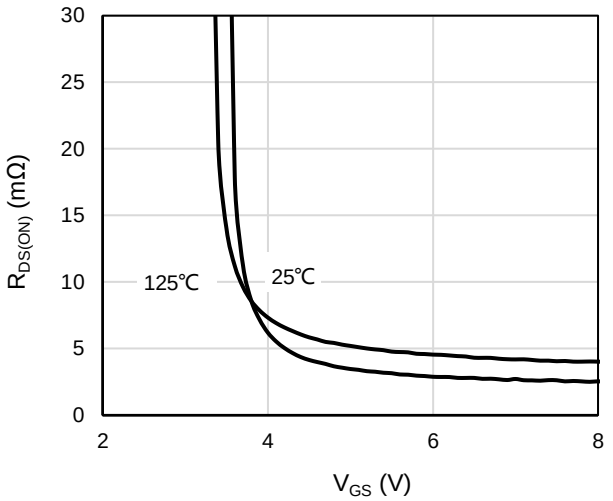


Figure 8: On-Resistance vs. Gate-Source Voltage

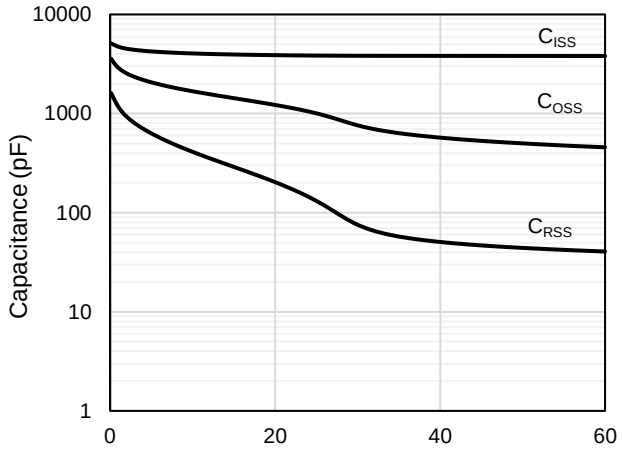


Figure 9: Capacitance Characteristics

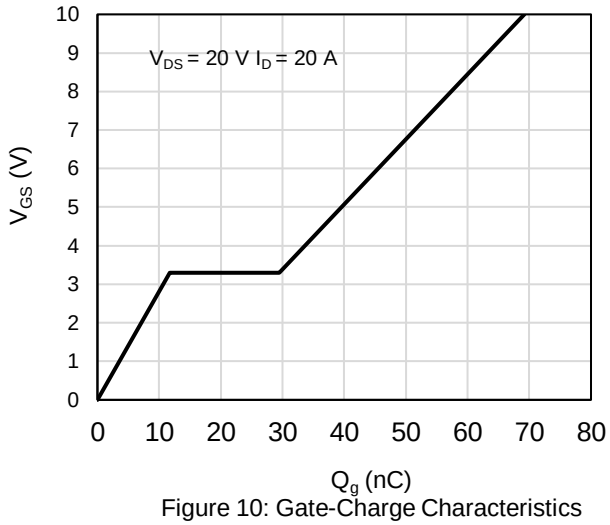


Figure 10: Gate-Charge Characteristics

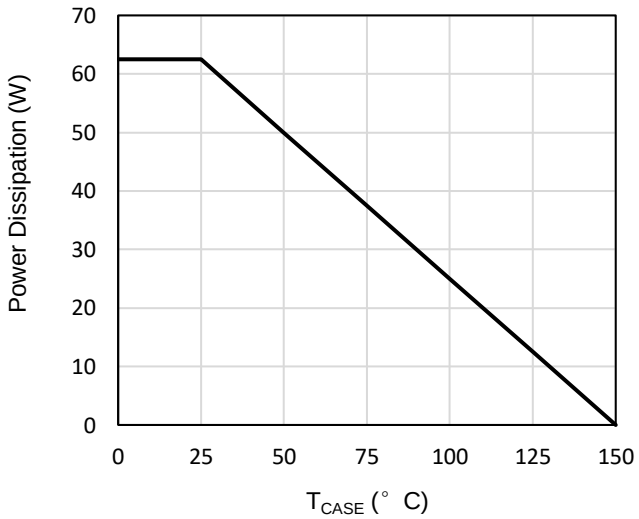


Figure 11: Power De-rating

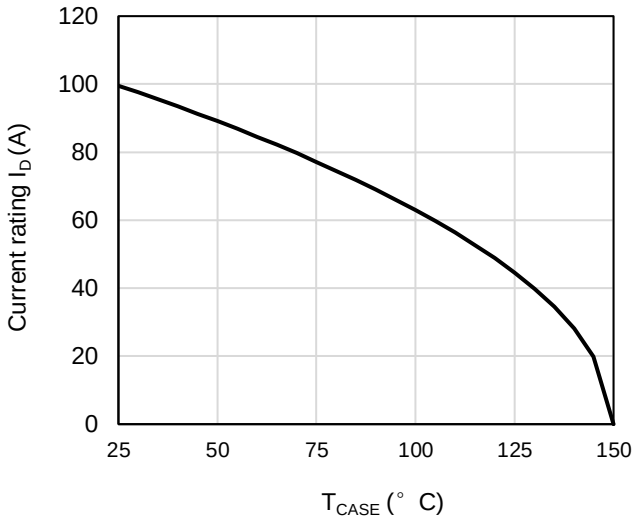


Figure 12: Current De-rating

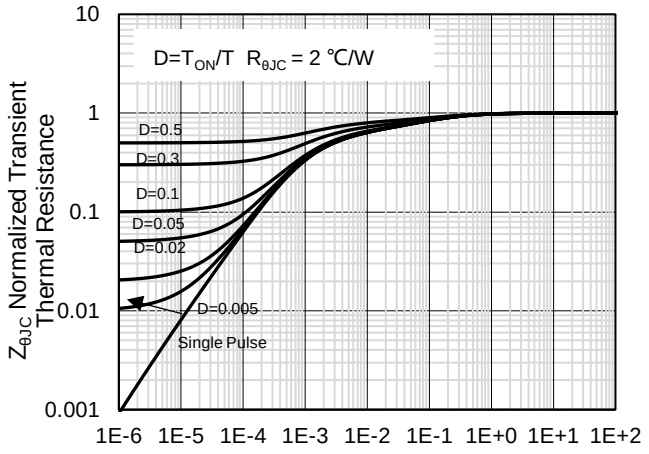


Figure 13: Normalized Maximum Transient Thermal Impedance

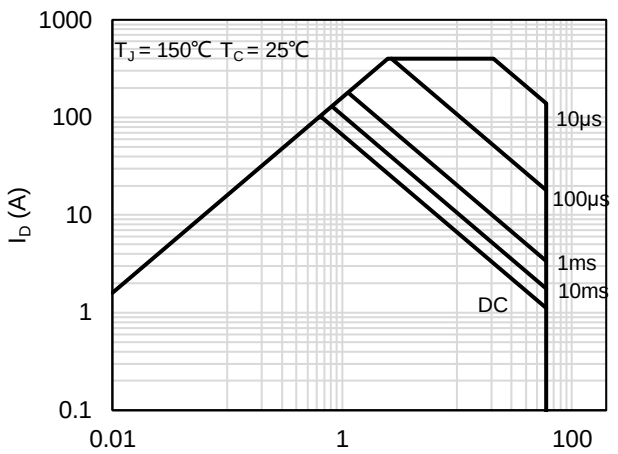
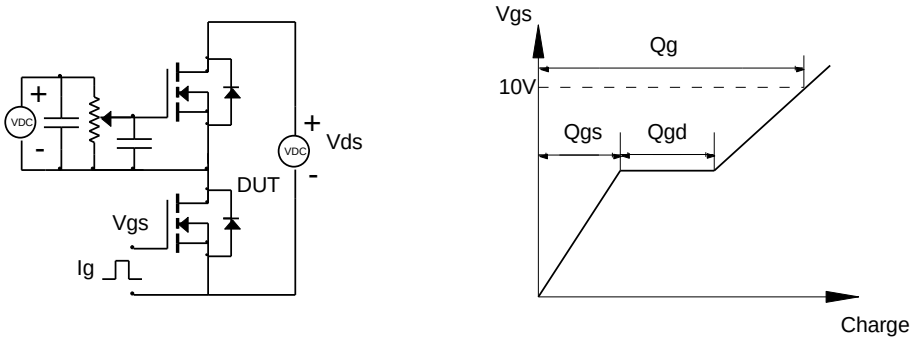


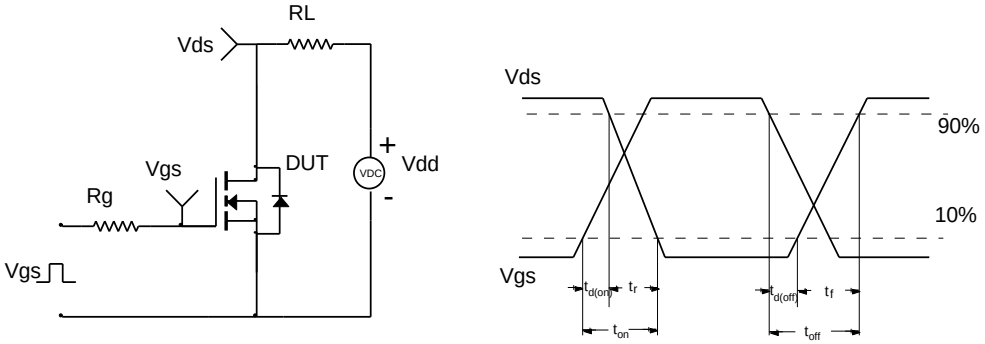
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

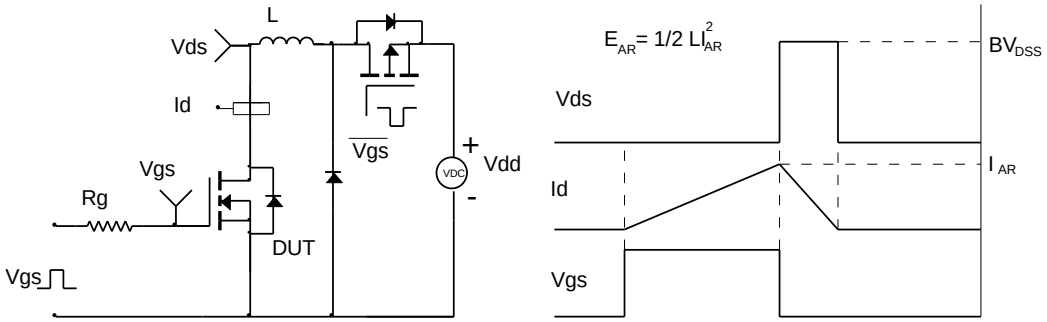
Gate Charge Test Circuit & Waveform



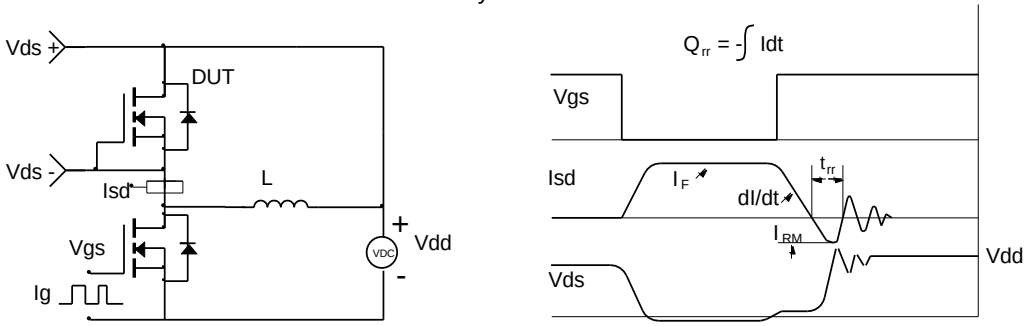
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



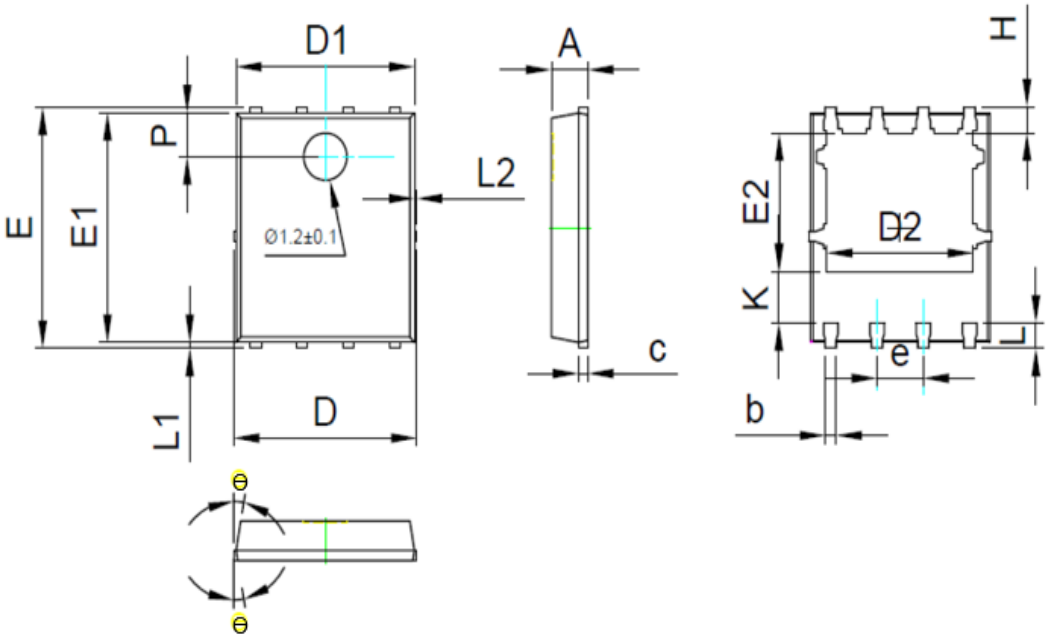
Diode Recovery Test Circuit & Waveforms



Package Outlines

Package Dimensions： DFN 5*6 PACKAG

E



COMMON DIMENSIONS

(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D	-	-	5.1
D1	4.85	4.90	4.95
D2	3.96	4.01	4.06
e		1.27 BSC	
E	5.95	6.00	6.05
E1	5.70	5.75	5.80
E2	3.425	3.475	3.525
H	0.60	0.65	0.70
K	1.29	-	-
L	0.60	0.65	0.70
L1	0.05	0.15	0.25
L2	-	-	0.12
θ	8°	10°	12°
P	1.05	1.10	1.15