

• General Description

The SI004N10NG1 combines advanced SGT MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

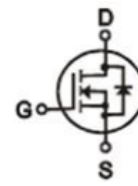
• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

- Synchronous Rectification for AC-DC/DC-DC converter
- Oring switches
- Power Tools

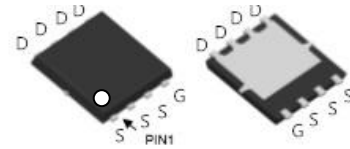
• Product Summary



$V_{DS} = 100V$

$R_{DS(ON)} = 3.6m\Omega$

$I_D = 160A$



DFN5 x 6

• Ordering Information:

Part NO.	SI004N10NG1
Marking	SI004N10G1
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

• Absolute Maximum Ratings:

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current(TC=25°C)	$I_D@TC=25^\circ C$	160	A
	$I_D@TC=75^\circ C$	121	A
	$I_D@TC=100^\circ C$	100	A
Pulsed Drain Current ①	I_{DM}	480	A
Total Power Dissipation(TC=25°C)	$P_D@TC=25^\circ C$	85	W
Total Power Dissipation(TA=25°C)	$P_D@TA=25^\circ C$	3.4	W
Operating Junction Temperature	T_J	-55 to 150	°C
Storage Temperature	T_{STG}	-55 to 150	°C
Single Pulse Avalanche Energy@L=0.1mH	E_{AS}	50	mJ
Avalanche Current@L=0.1mH	I_{AS}	35	A

● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.5	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	37	° C/W
Soldering temperature, wave soldering for 10s	T_{sold}	-	-	265	° C

● Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	100			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.2		2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 25A$		3.6	4.5	m Ω
		$V_{GS} = 4.5V, I_D = 15A$		5.0	6.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 25V, I_D = 10A$		28		s
Source-drain voltage	V_{SD}	$I_S = 25A$			1.28	V

● Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V$ $f = 1MHz$	-	4028	-	pF
Output capacitance	C_{oss}		-	1787	-	
Reverse transfer capacitance	C_{rss}		-	91	-	

● Gate Charge characteristics ($T_a = 25^\circ C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD} = 25V$	-	53	-	nC
Gate - Source charge	Q_{gs}	$I_D = 8A$	-	7.2	-	
Gate - Drain charge	Q_{gd}	$V_{GS} = 10V$	-	11.2	-	
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20A,$ $di/dt = 100A/\mu s$		TBD		nS
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20A,$ $di/dt = 100A/\mu s$		TBD		nC

Note: ① Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$;

Fig.1 Gate-Charge Characteristics

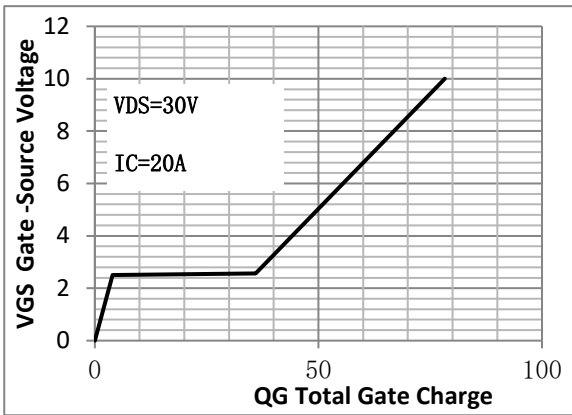


Fig.2 Capacitance Characteristics

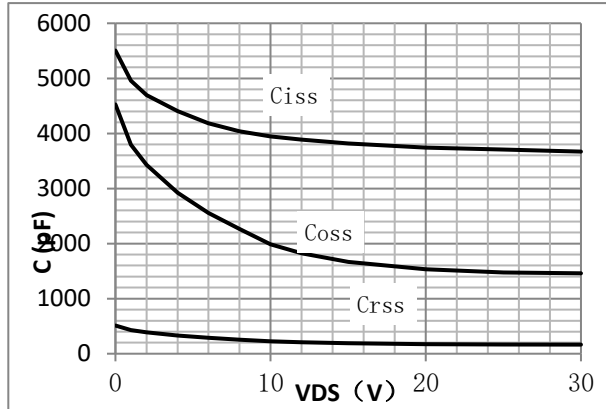


Fig.3 Power Dissipation

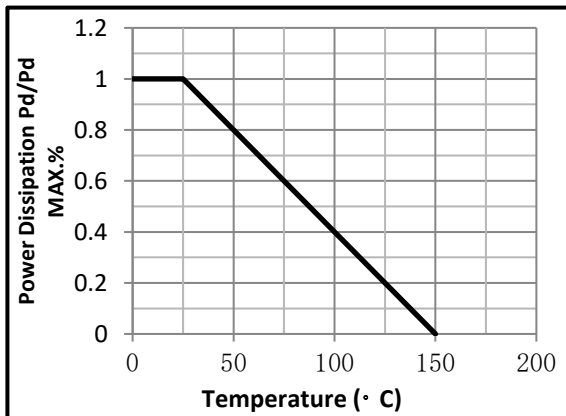


Fig.4 Typical output Characteristics

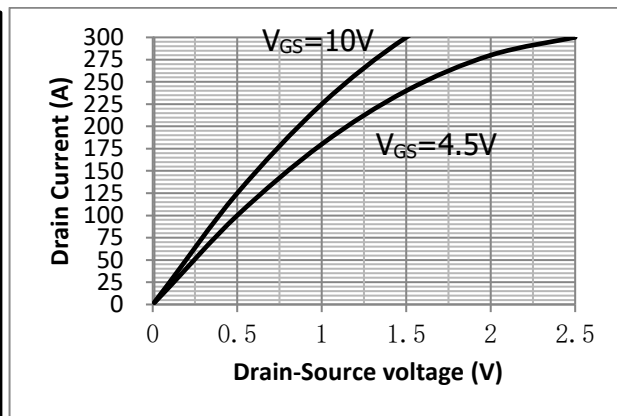


Fig.5 Threshold Voltage V.S Junction Temperature

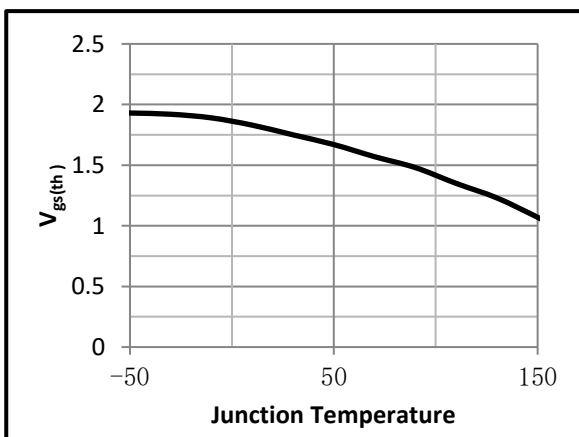


Fig.6 Resistance V.S Drain Current

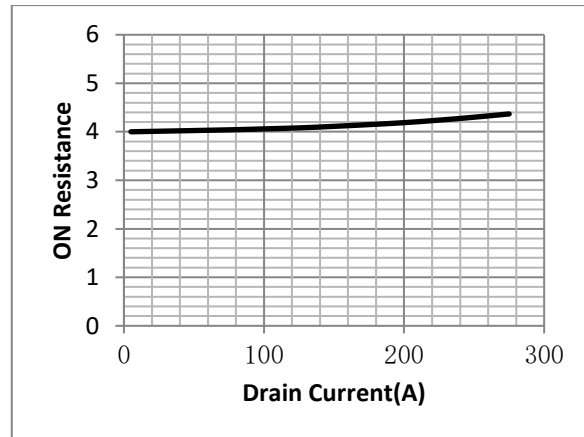


Fig.7 On-Resistance VS Gate Source Voltage

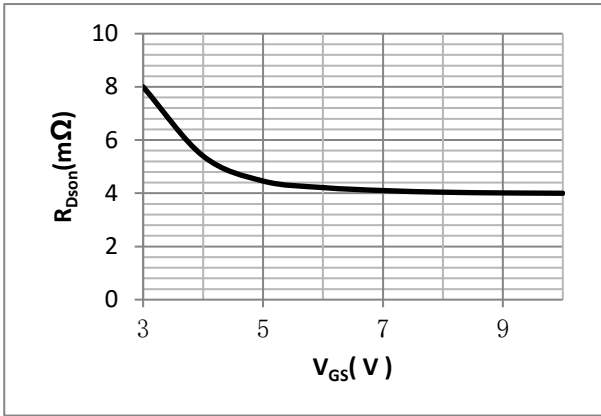


Fig.8 On-Resistance V.S Junction Temperature

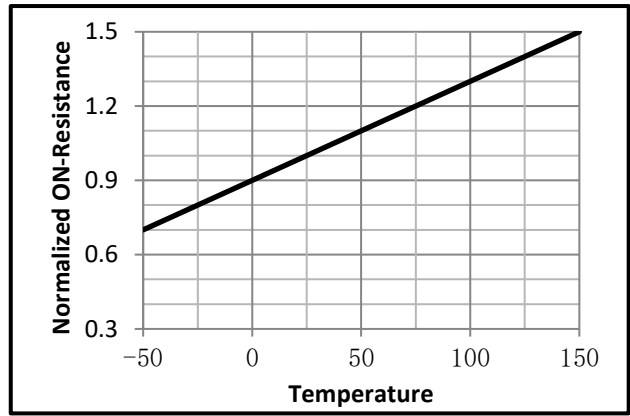


Fig.9 SOA Maximum Safe Operating Area

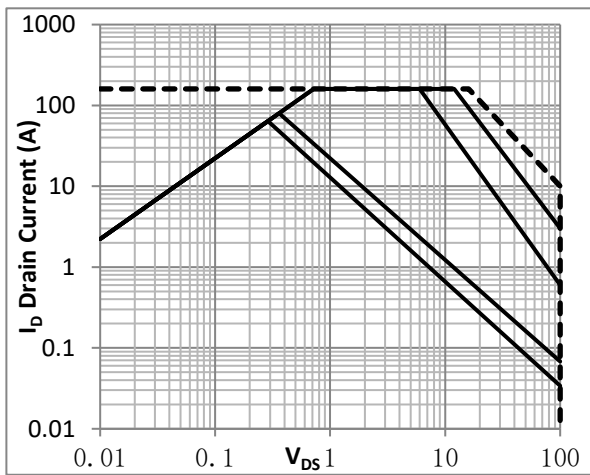


Fig.10 I_D -Junction Temperature

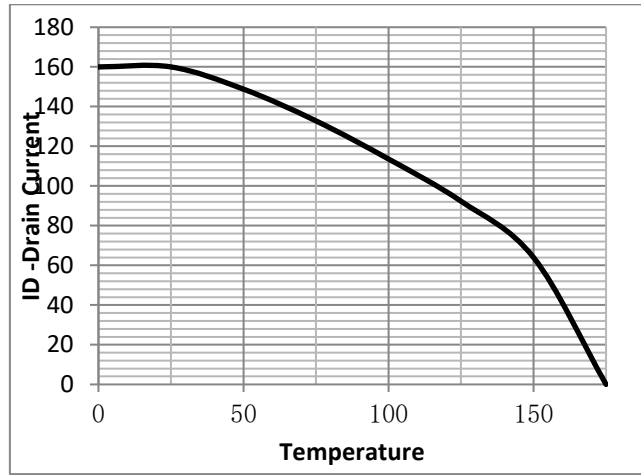


Fig.11 Switching Time Measurement Circuit

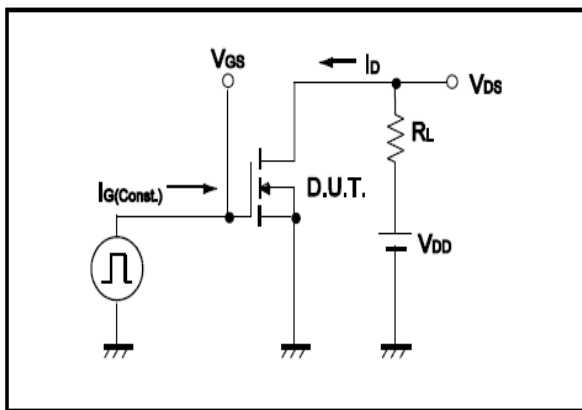


Fig.12 Gate Charge Waveform

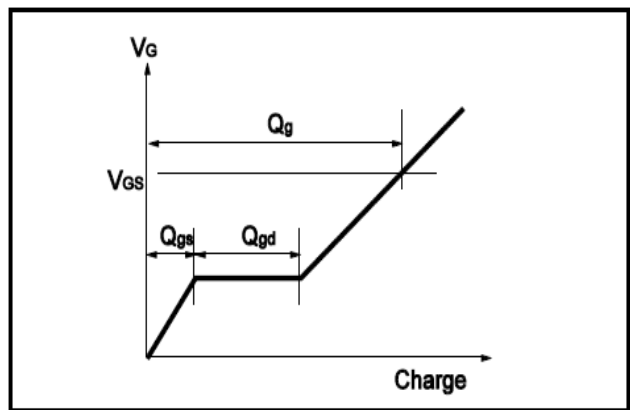


Fig.13 Switching Time Measurement Circuit

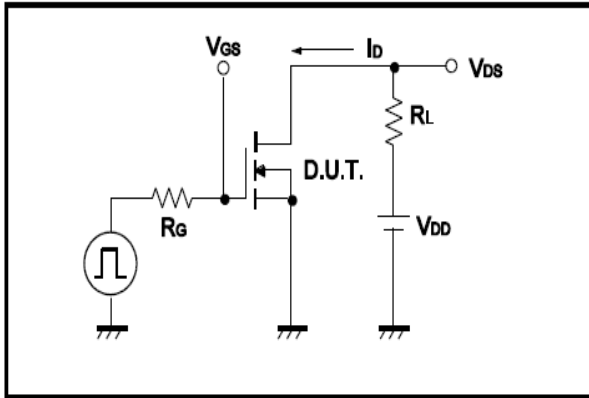


Fig.14 Gate Charge Waveform

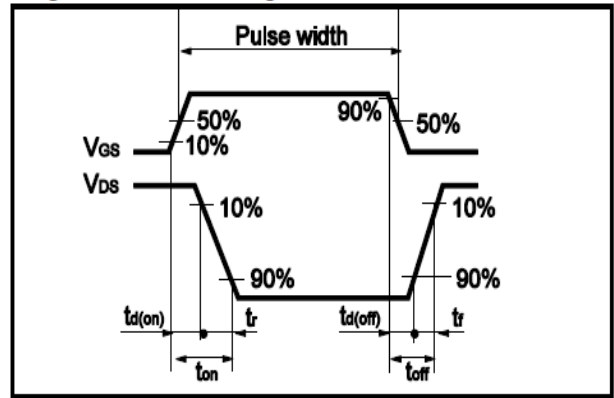


Fig.15 Avalanche Measurement Circuit

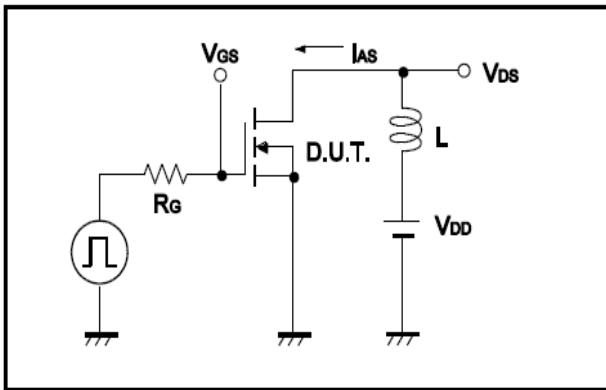
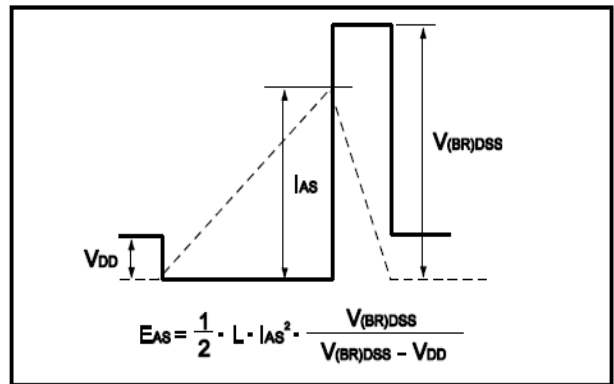
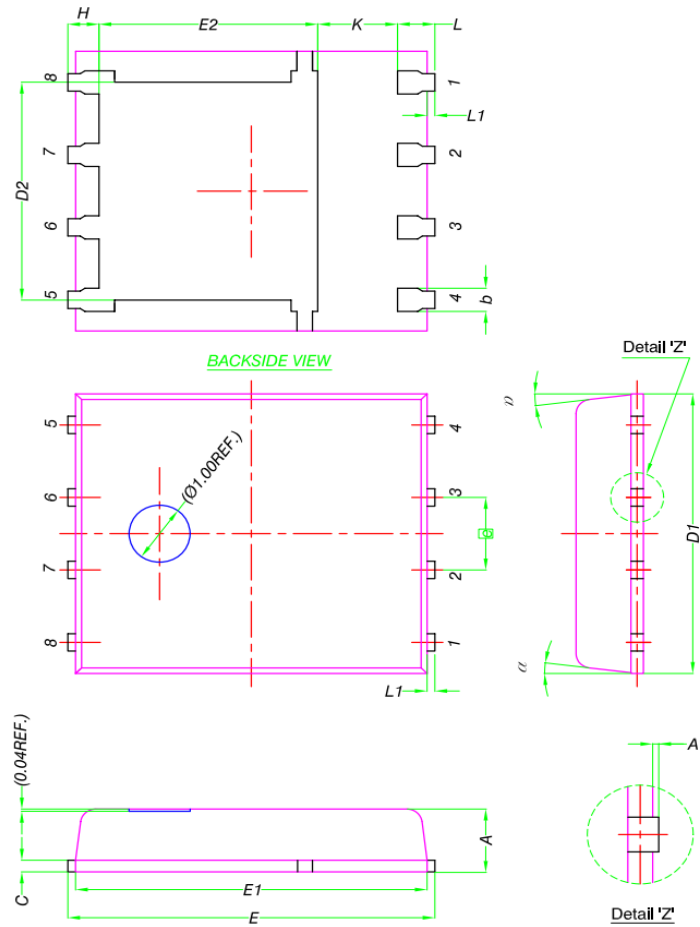


Fig.16 Avalanche Waveform



•Dimensions (DFN5x6)

Unit: mm



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
\square 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
α	0°	-	12°