V_{DSS}	60	V
I_D	80	A
$R_{DS(ON)}$	3.8	mΩ

Features

Uses advanced SGT technology

Extremely low on-resistance RDS(on)

Excellent gate charge x RDS(on) product(FOM)

Application

DC/DC conversion

Power switcht

Motor drives

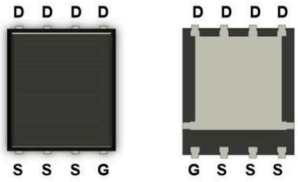
GK xxx
S004N06

LOGO — GK xxx — CODE

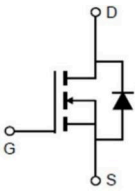
S004N06

RDS(ON) — VDSS

PDFN5X6-8L top&bottom view



Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current T_c=25℃（Silicon limit） T_c=100℃（Silicon limit）	I_D	 80 51	A
Pulsed Drain Current	I_{DM}	320	A
Maximum Power Dissipation	P_d	52	W
Single pulse avalanche energy	E_{AS}	138	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To +150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	R_{thJC}	2.4	℃/W

Electrical Characteristics (T_J=25℃unless otherwise noted)

Parameter	Symbol	Condition	min	typ	max	Unit
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	60	68	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.2	1.9	2.6	
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	I_D=30A,V_{GS}=10V	-	3.8	4.5	mΩ
		I_D=15A,V_{GS}=4.5V		5	6	mΩ
Transconductance	g_{FS}	V_{DS}=5V, I_D=30A	-	102	-	S
Dynamic Characteristic						
Input Capacitance	C_{iss}	V_{DS}=30V,V_{GS}=0V, f=1MHz	-	2304	-	pF
Output Capacitance	C_{oss}		-	388	-	
Reverse Transfer Capacitance	C_{rss}		-	15	-	
Gate resistance	Rg	f=1MHz	-	0.9	-	Ω
Gate Total Charge	Q_G	V_{DS}=30V,I_D=15A, V_{GS}=10V	-	34	-	nC
Gate-Source charge	Q_{gs}		-	7.6	-	
Gate-Drain charge	Q_{gd}		-	6	-	
Turn-on delay time	$t_{d(on)}$	V_{GS}=10V, V_{DS}=30V, R_G=6Ω	-	13	-	ns
Rise time	t_r		-	12	-	
Turn-off delay time	$t_{d(off)}$		-	30	-	
Fall time	t_f		-	16	-	
Body Diode Characteristic						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=30A	-	0.9	1.2	v
Reverse Recovery Time	t_{rr}	I_F =30A di/dt = 100A/μs	-	33	-	ns
Reverse Recovery Charge	Q_{rr}		-	28	-	nC

RATING AND CHARACTERISTIC CURVES

Fig.1 Typ. transfer characteristics

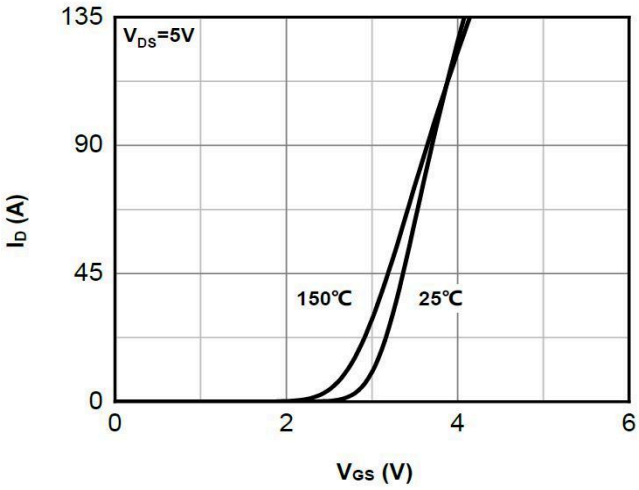


Fig.2 Typ. output characteristics

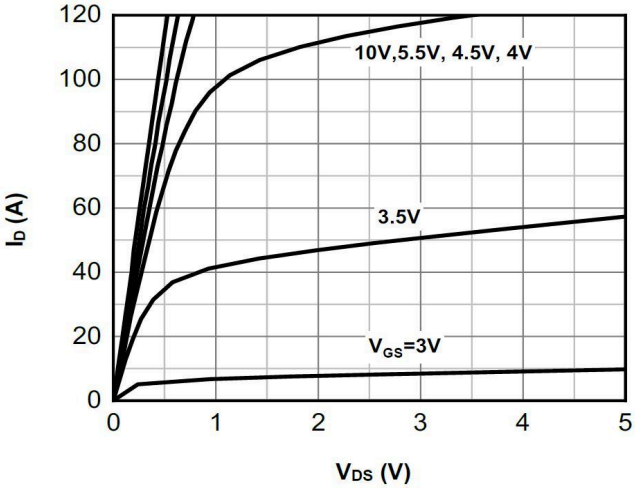


Fig.3 Normalized on-resistance vs drain current

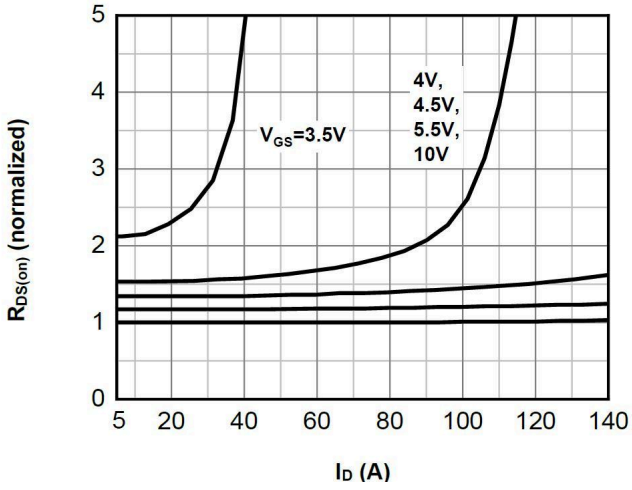


Fig.4 Typ. on-resistance vs gate-source voltage

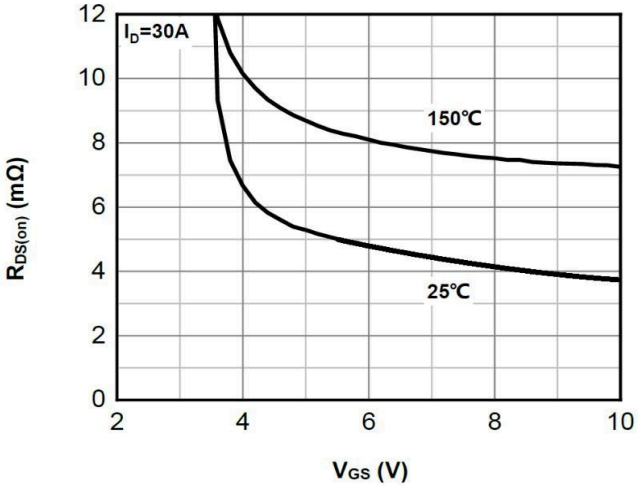


Fig.5 Normalized on-resistance vs junction temperature

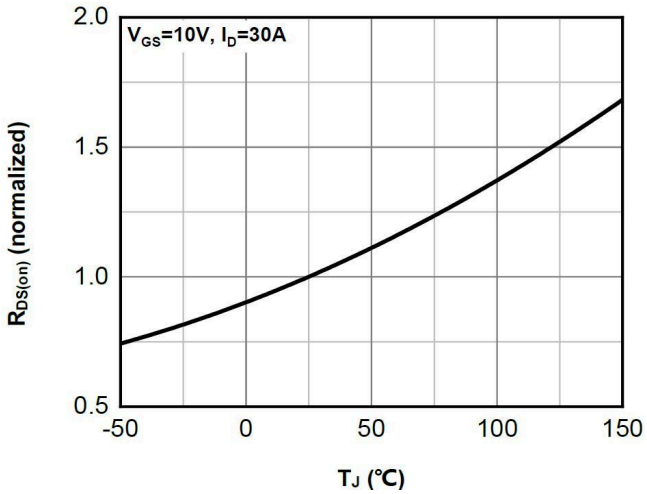
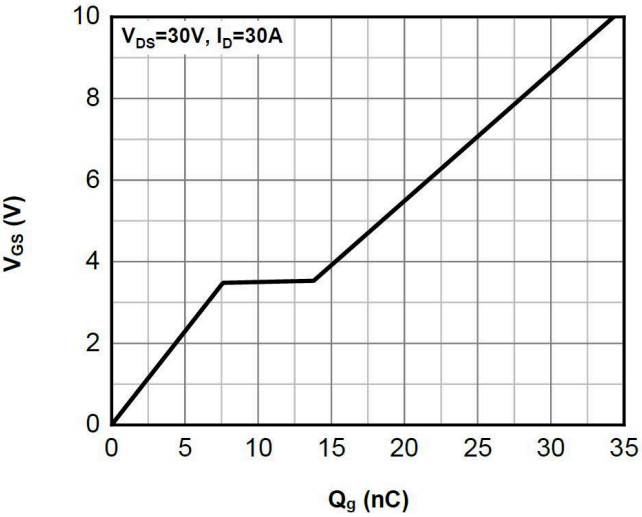


Fig.6 Typ. gate charge



RATING AND CHARACTERISTIC CURVES

Fig.7 Typ. forward characteristics of body diode

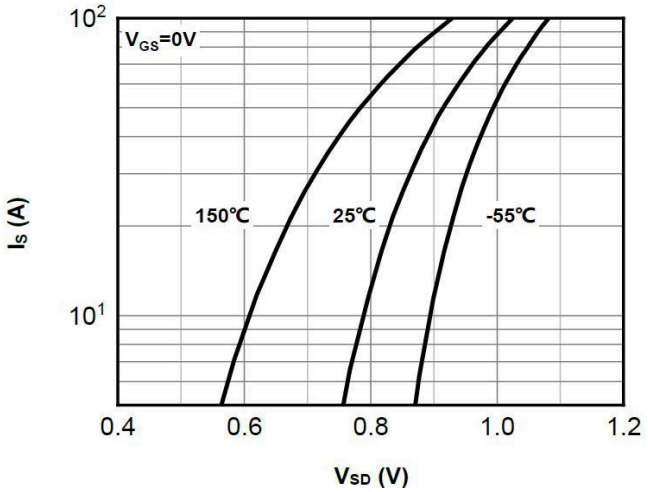


Fig.8 Safe operating area

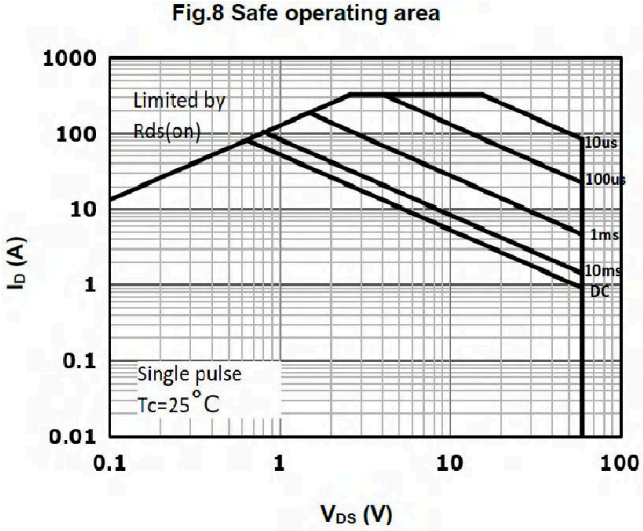


Fig.9 Typ. Capacitance

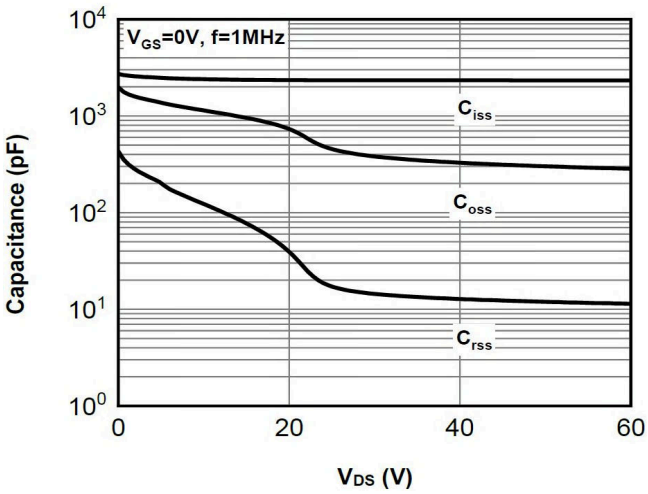


Fig.10 Single pulse maximum power dissipation

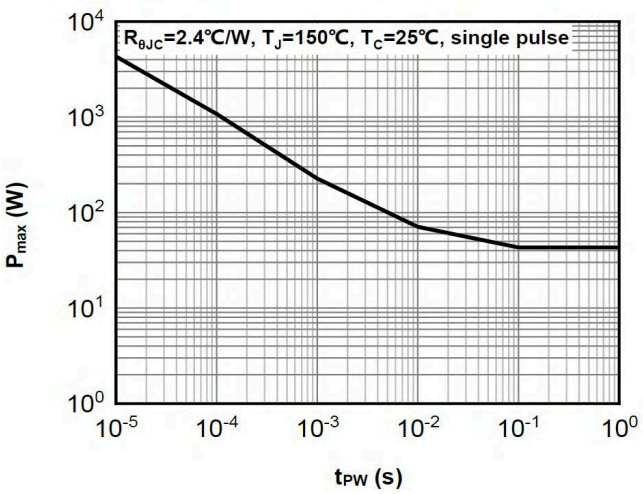


Fig.11 Max. power dissipation vs case temperature

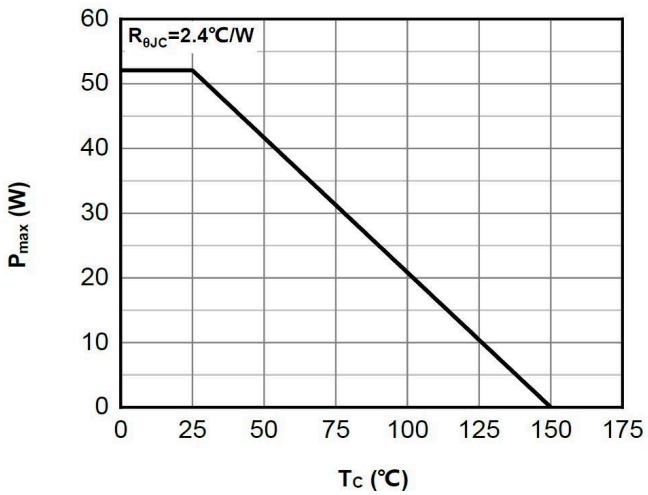
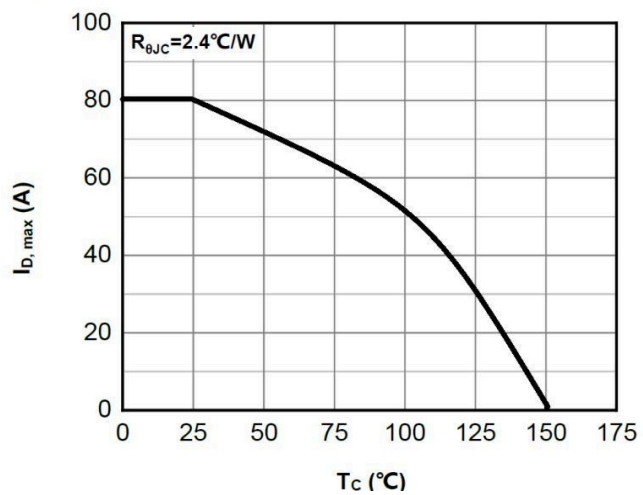


Fig.12 Max. continuous drain current vs case temperature



RATING AND CHARACTERISTIC CURVES

Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

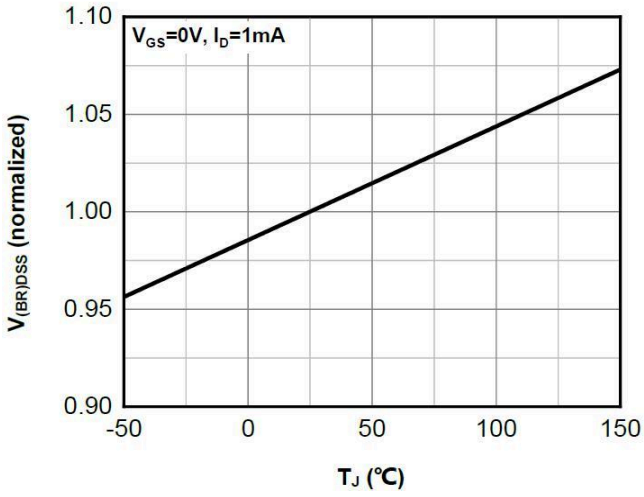


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

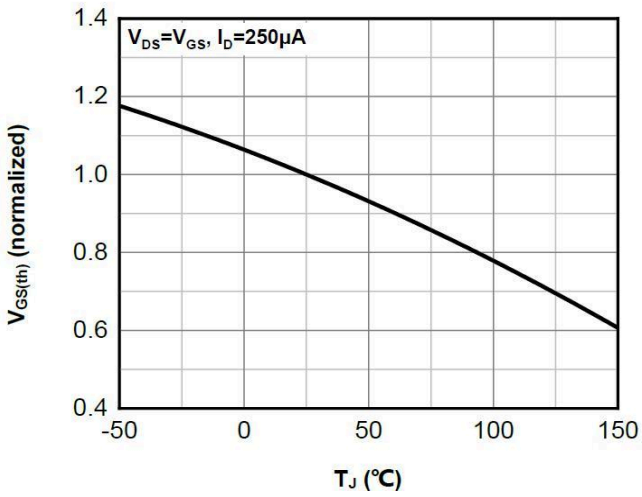
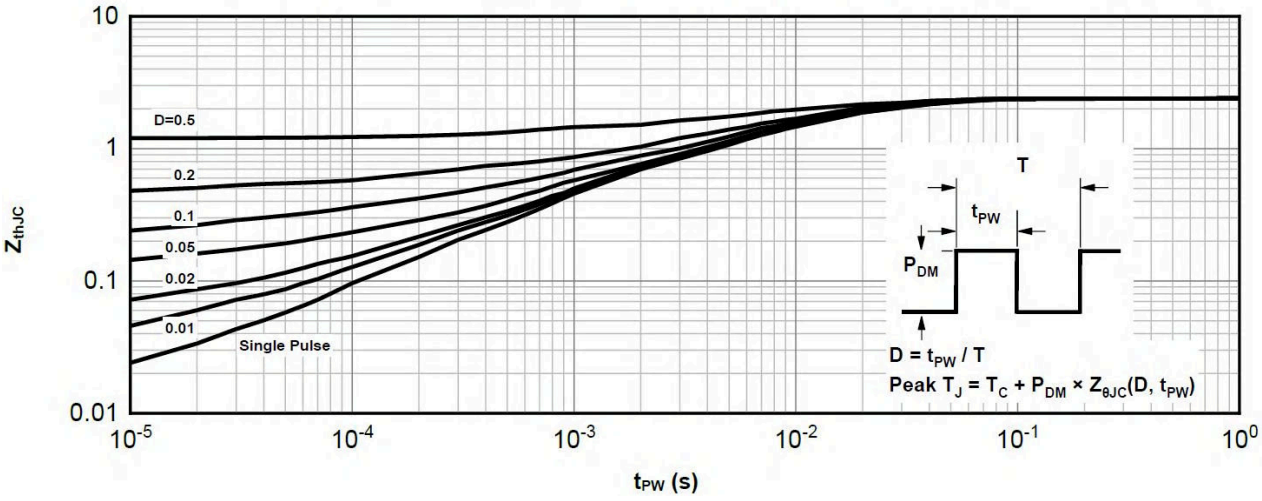
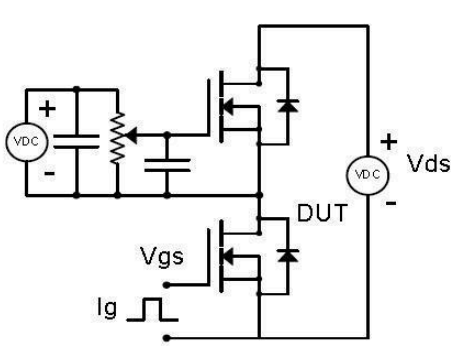


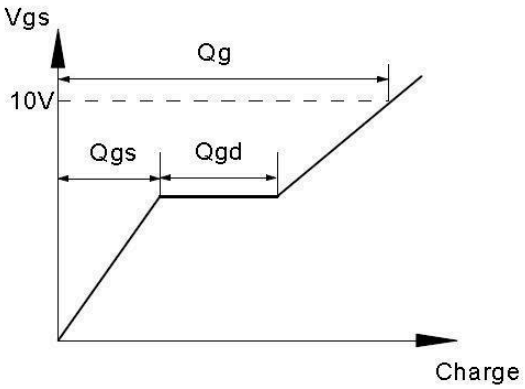
Fig.15 Transient thermal impedance from junction to case



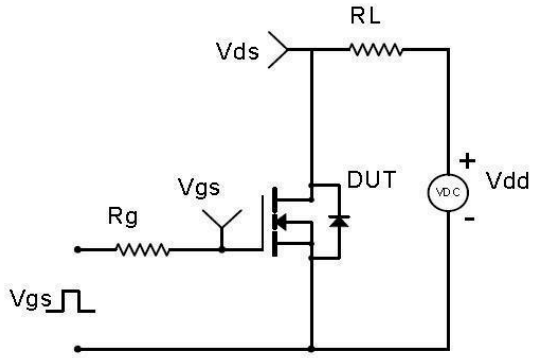
Test Circuit & Waveform

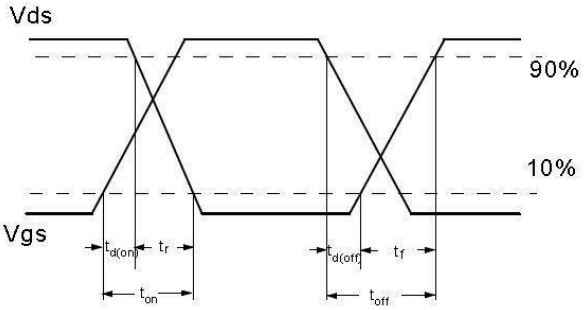
Gate Charge Test Circuit & Waveform



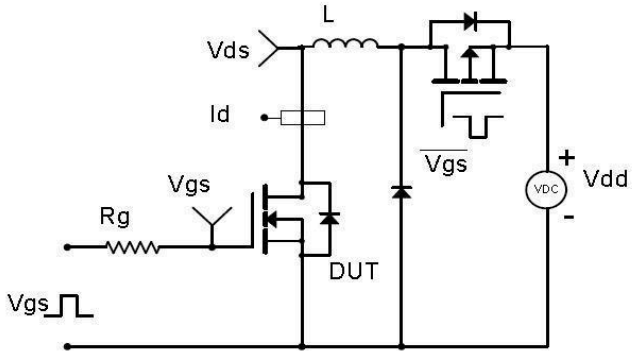


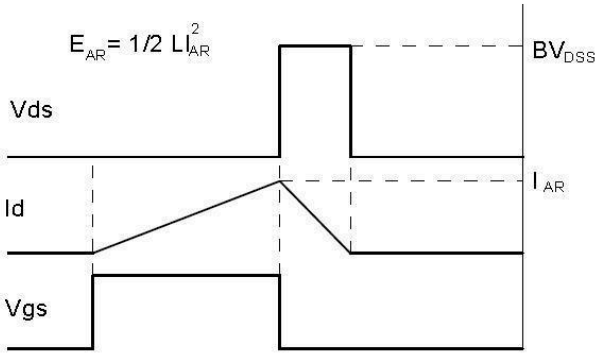
Resistive Switching Test Circuit & Waveforms



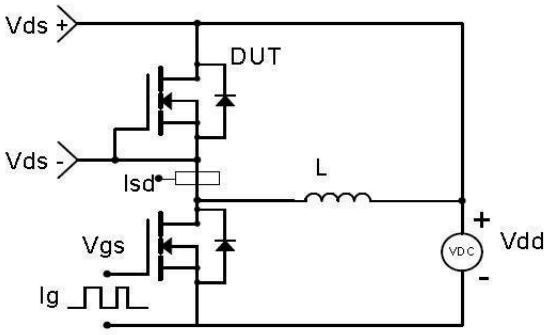


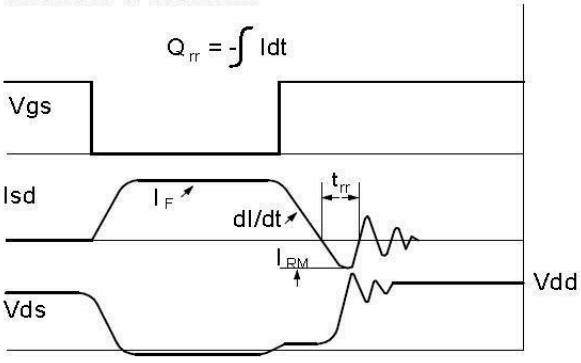
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms

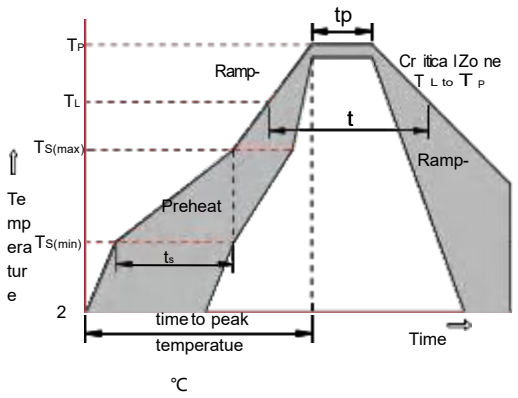




Soldering parameters

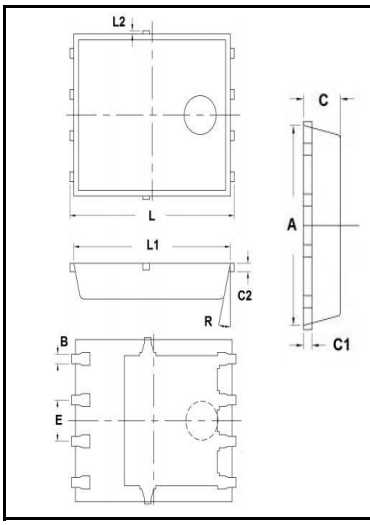
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition

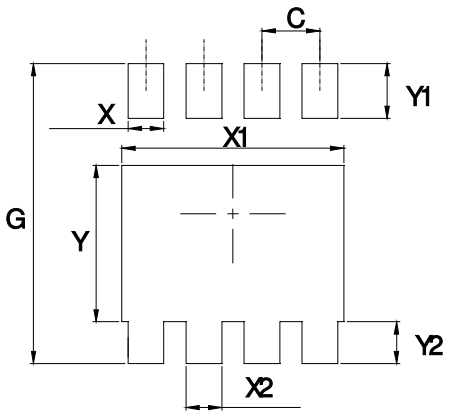


Package Dimensions & Suggested Pad Layout

PDFN5*6



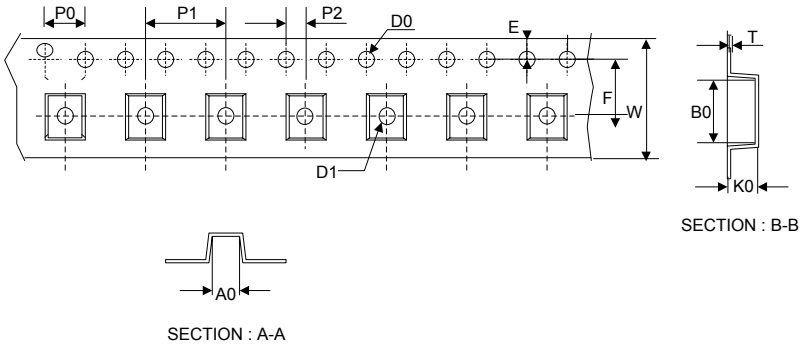
Dim.	Min.	Max.
A	4.8	5.2
B	0.25	0.35
C	1	1.2
C1	Typ0.254	
C2	Typ0.254	
E	Typ1.27	
L	6	6.3
L1	5.7	6
L2	Max0.2	
R	Typ13°	
All Dimensions in millimeter		



Dimensions	Value (in mm)
C	1.27
G	6.45
X	0.62
X1	4.50
X2	0.62
Y	3.70
Y1	1.05
Y2	0.80

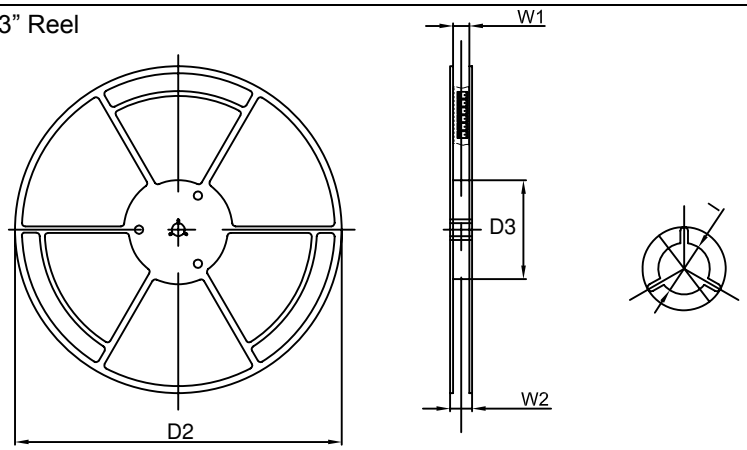
Tape & rell specification

Tape



Symbol	Dimension (mm)
P0	4.00±0.20
P1	8.00±0.20
P2	2.00±0.20
D0	1.55±0.20
D1	1.55±0.20
E	1.75±0.20
F	5.50±0.20
W	12.00±0.20
A0	6.60±0.20
B0	5.70±0.20
K0	1.30±0.20
T	0.20±0.20

13” Reel



D2	330.0±5.0
D3	100.0±4.0
W1	12.0±5.0
W2	14.0±5.0
I	13.0±2.0

Quantity: 5000PCS

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