V_{DSS} 40 V
I_D 117 A
$R_{DS(ON)}$ 1.86 mΩ

Features

Uses advanced Trench technology
Extremely low on-resistance RDS(on)
Excellent gate charge x RDS(on) product(FOM)

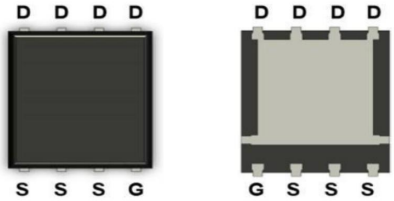
GK xxx
T002N04

LOGO GK xxx CODE
T002N04
RDS(ON) VDSS

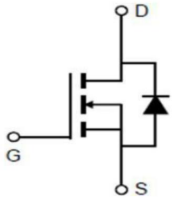
Application

Motor control and drive
Battery management
DC/DC

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}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current T_c=25℃（Silicon limit） T_c=100℃（Silicon limit）	I_D	 117 74	A
Pulsed Drain Current	I_{DM}	380	A
Maximum Power Dissipation	P_d	52	W
Single pulse avalanche energy	E_{AS}	649	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
Thermal Resistance,Junction-to-ambient	R_{thJA}	50	

Electrical Characteristics (T_J=25℃unless otherwise noted)

Static Characteristic	Symbo	Condition	min	typ	max	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.0	1.5	2.4	
Zero gate voltage drain 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
Drain-source on-state resistance	$R_{DS(on)}$	I_D=20A,V_{GS}=10V	-	1.86	2.3	mΩ
		I_D=20A,V_{GS}=4.5V	-	2.55	3	

Dynamic Characteristic						
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, f=1MHz	-	6223	-	pF
Output Capacitance	C_{oss}		-	515	-	
Reverse Transfer Capacitance	C_{rss}		-	493	-	
Gate resistance	Rg	f=1MHz	-	1.1	-	Ω
Gate Total Charge	Q_G	V_{DS}=20V,I_D=20A, V_{GS}=10V	-	134	-	nC
Gate-Source charge	Q_{gs}		-	16	-	
Gate-Drain charge	Q_{gd}		-	30	-	
Turn-on delay time	$t_{d(on)}$	V_{GS}=10V, V_{DS}=20V, R_G=3Ω	-	20	-	ns
Rise time	t_r		-	31	-	
Turn-off delay time	$t_{d(off)}$		-	121	-	
Fall time	t_f		-	49	-	

Body Diode Characteristic						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=50A	-	0.8	1.2	v
Reverse Recovery Time	t_{rr}	I_F =50A di/dt = 100A/μs	-	65	-	ns
Reverse Recovery Charge	Q_{rr}		-	62	-	nC

RATING AND CHARACTERISTIC CURVES

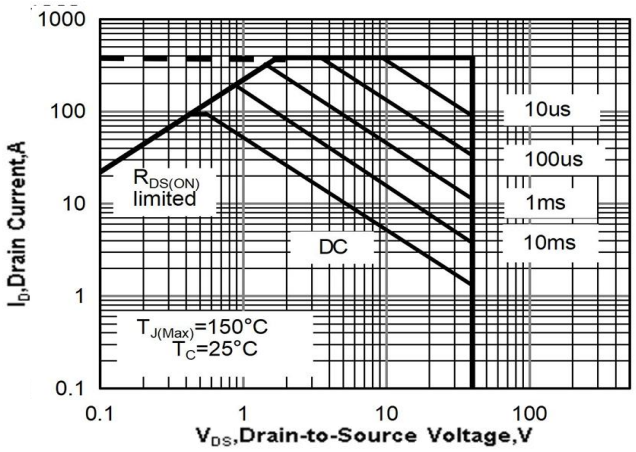


Figure 1 . Maximum Safe Operating Area

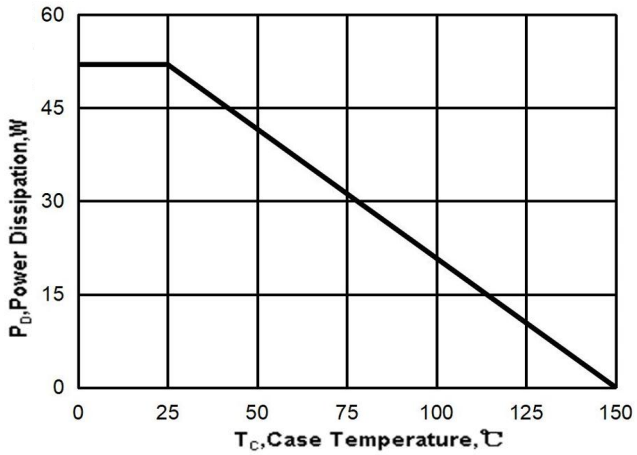


Figure 2. Maximum Power Dissipation vs Case Temperature

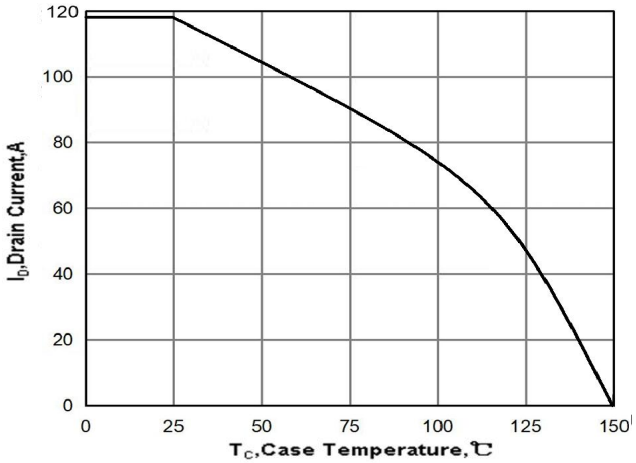


Figure 3. Maximum Continuous Drain Current vs Case Temperature

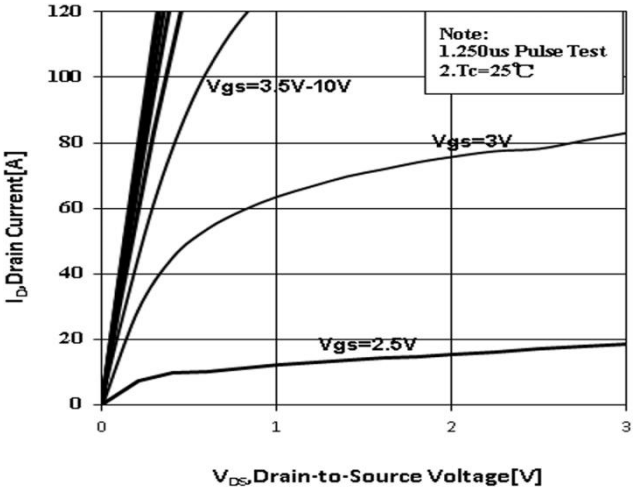


Figure 4. Typical output Characteristics

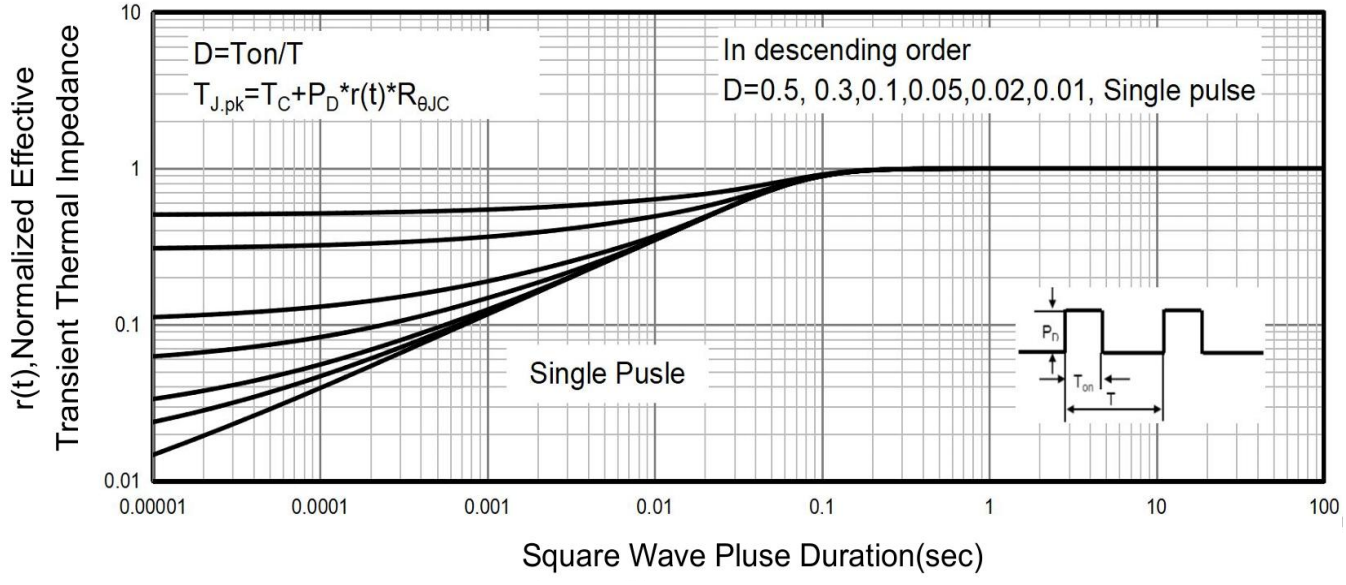


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

RATING AND CHARACTERISTIC CURVES

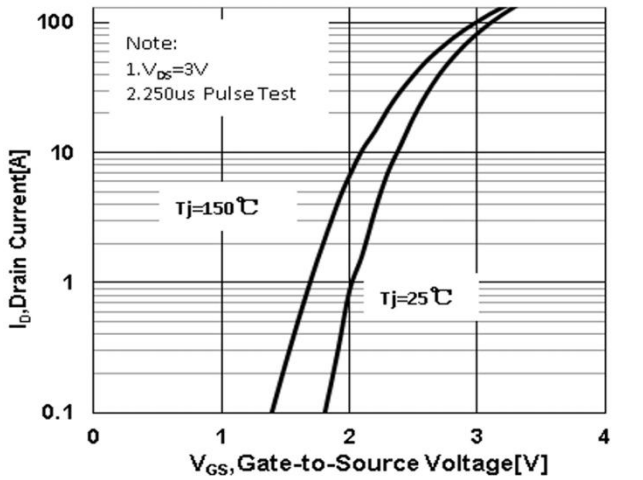


Figure 6 Typical Transfer Characteristics

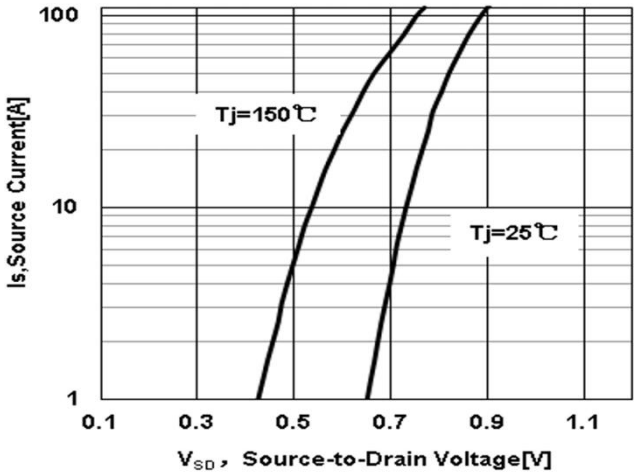


Figure 7 Typical Body Diode Transfer Characteristics

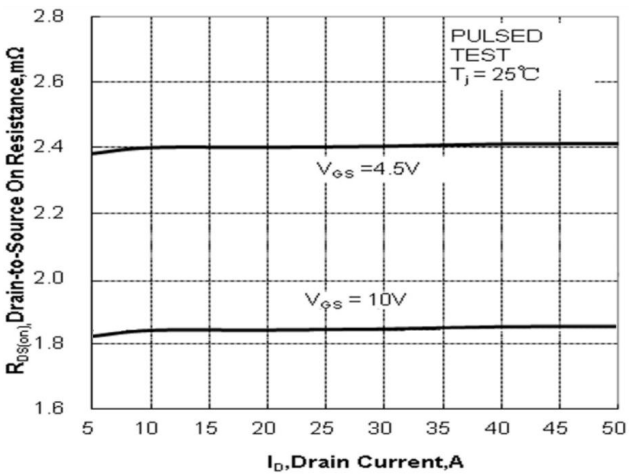


Figure 8. Drain-to-Source On Resistance vs Drain Current

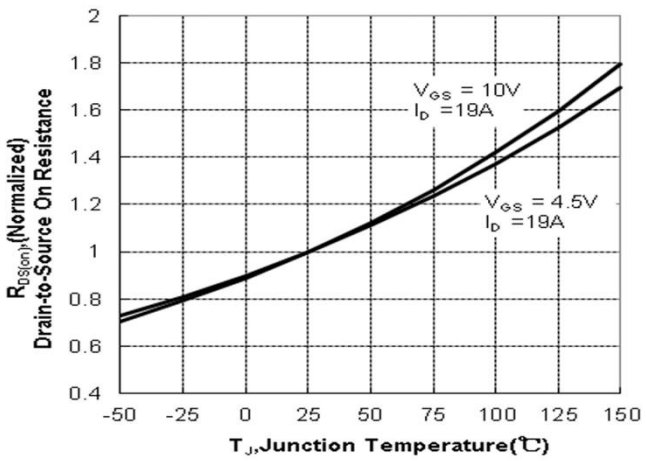


Figure 9. Normalized On Resistance vs Junction Temperature

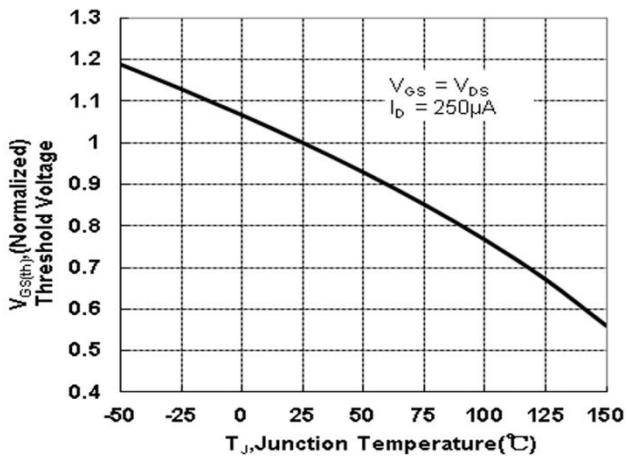


Figure10. Normalized Threshold Voltage vs Junction Temperature

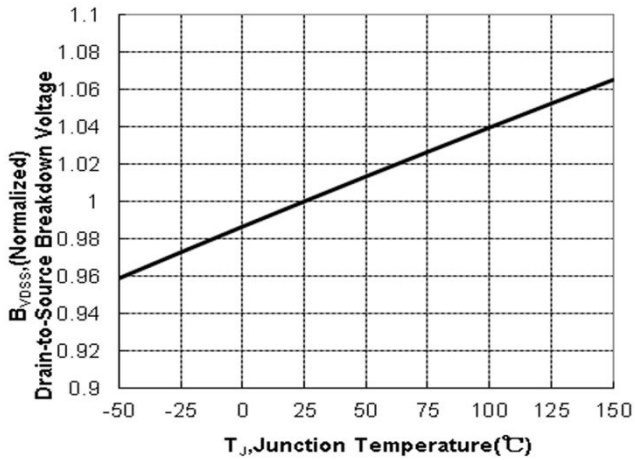


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

RATING AND CHARACTERISTIC CURVES

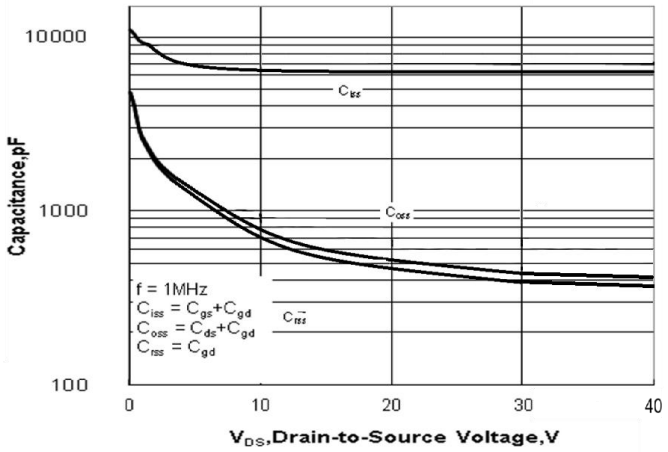


Figure 12. Capacitance Characteristics

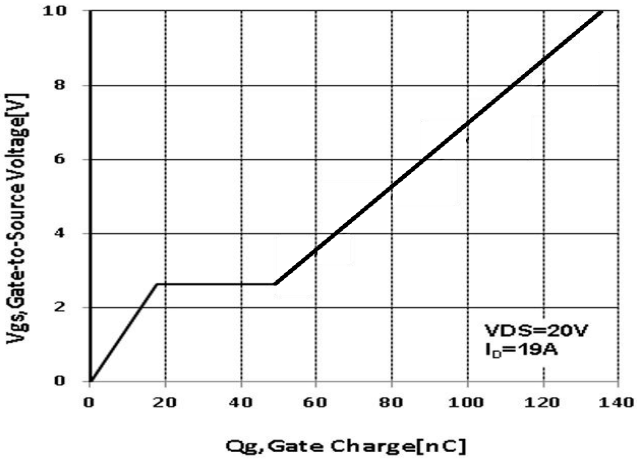


Figure 13 Typical Gate Charge vs Gate to Source Voltage

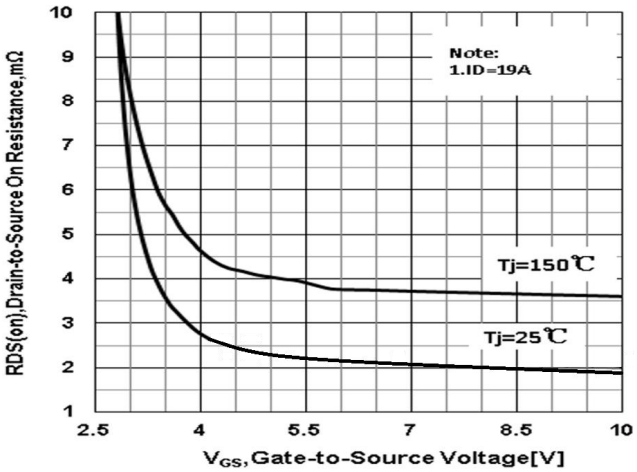
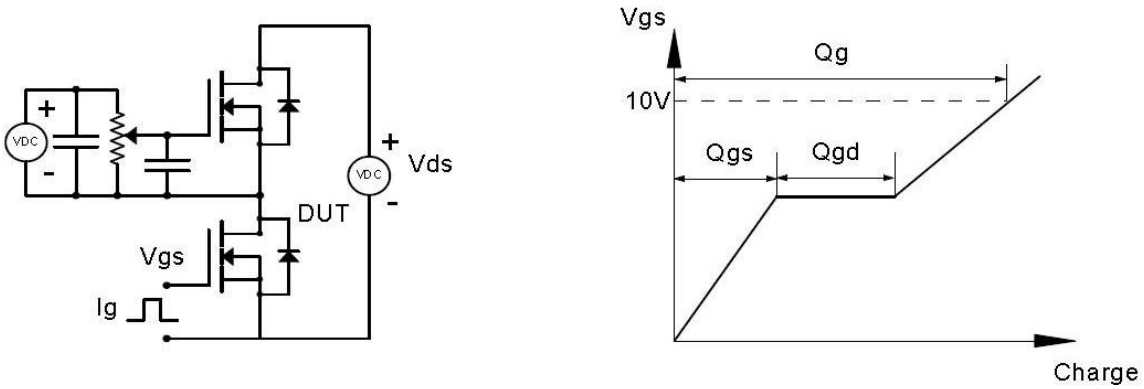


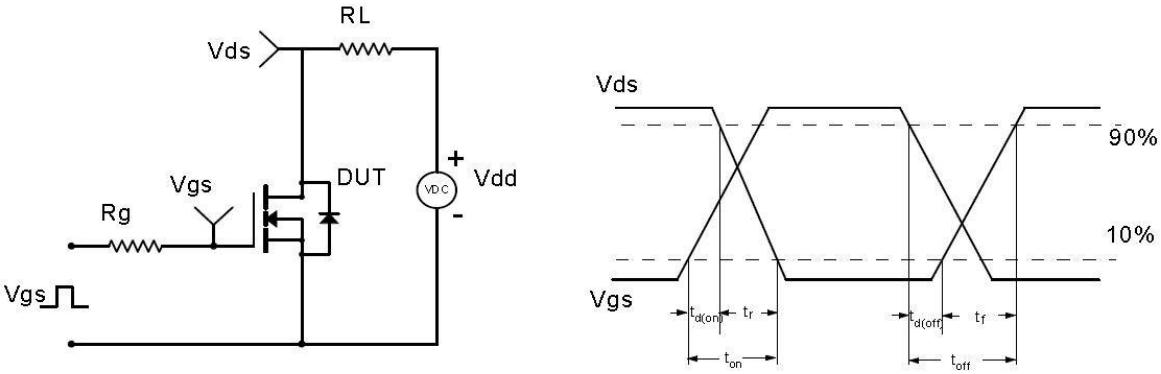
Figure 14 . Drain-to-Source On Resistance vs Gate Voltage

Test Circuit & Waveform

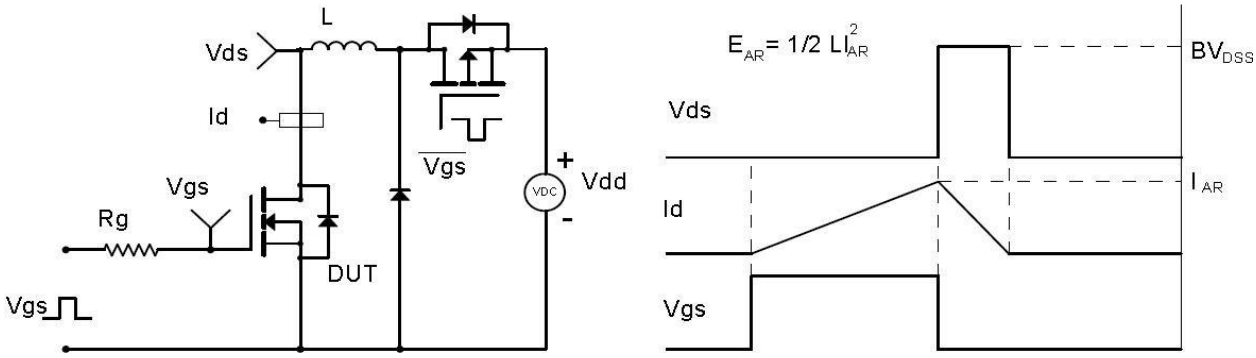
Gate Charge Test Circuit & Waveform



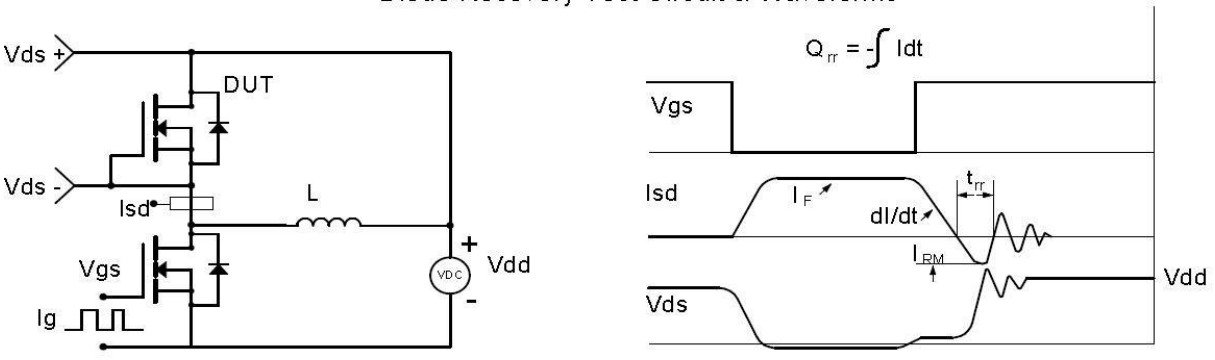
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



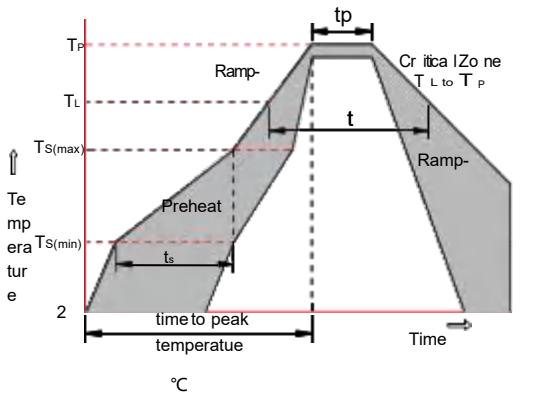
Diode Recovery Test Circuit & Waveforms



Soldering parameters

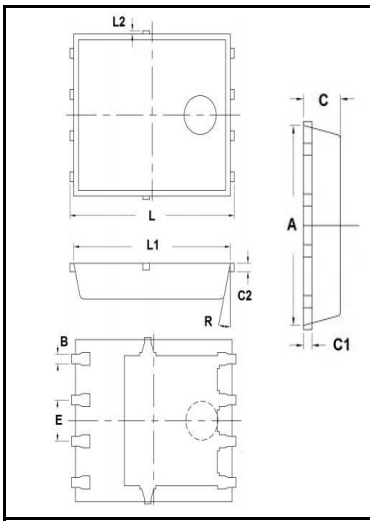
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid 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

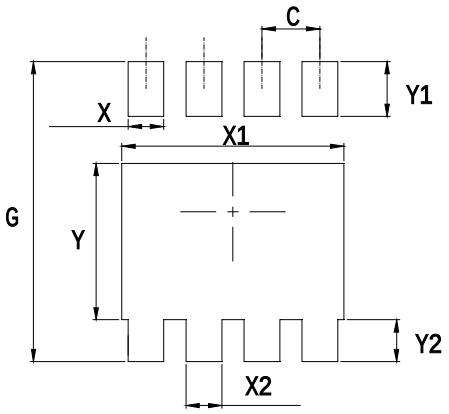


Package Dimensions & Suggested Pad Layout

PDFN5*6



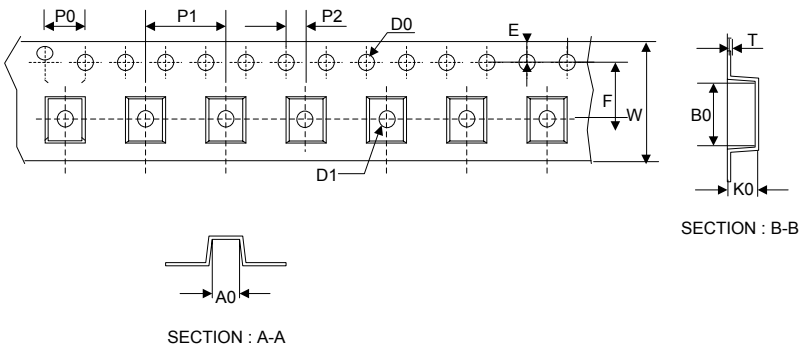
Dim.	Min.	Max.
A	4.8	5.2
B	0.25	0.35
C	1	1.2
C1	Typ0.254	
C2	Typ0.254	
E	Typ1.27	
L	6	6.3
L1	5.7	6
L2	Max0.2	
R	Typ13°	
All Dimensions in millimeter		



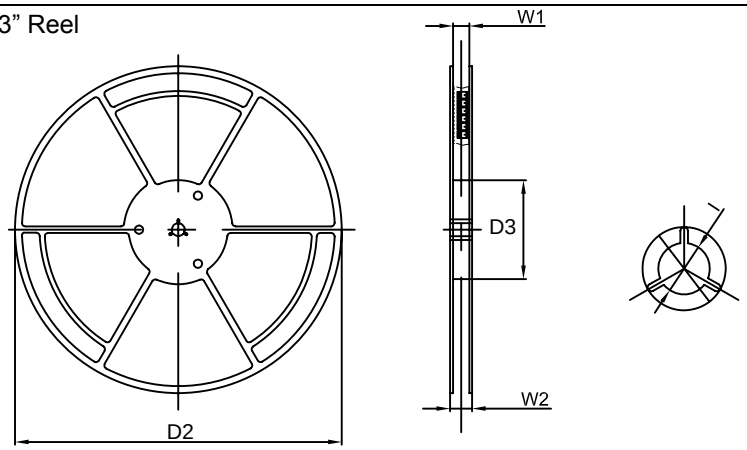
Dimensions	Value (in mm)
C	1.27
G	6.45
X	0.62
X1	4.50
X2	0.62
Y	3.70
Y1	1.05
Y2	0.80

Tape & rell specification

Tape



13” Reel



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
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