V_{DSS}	40	V
I_D	20	A
$R_{DS(ON)}$	15.6	mΩ

Features

Excellent gate charge x $R_{DS(on)}$ product(FOM)

$R_{DS(on).typ}$=15.6mΩ@V_{GS}=10V

High Reliability Capability

Application

Charger

DC/DC Converter

Ideal for high-frequency switching

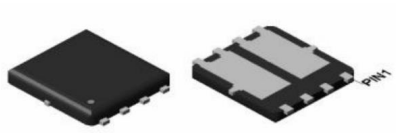
GK xxx
T016N04

LOGO GK xxx CODE

T016N04

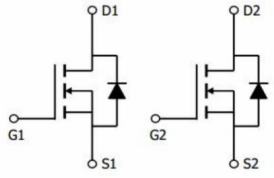
RDS(ON) VDSS

PDFN5X6-8L top&bottom view



Top View 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
Continuous Drain Current T_C = 25°C T_C = 100°C	I_D	 20 13	A
Pulsed Drain Current	$I_{D\ pulse}$	80	A
Avalanche Energy, Single Pulse	E_{AS}	46	mJ
Gate-emitter Voltage	V_{GS}	±20	V
Power Dissipation, T_C = 25℃	P_D	12	W
Operating Junction And Storage Temperature	T_j , T_{stg}	-55~150	℃

Thermal Resistance

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance, Junction to Case	R_{thJC}	-	10	℃/W
Thermal Resistance, Junction to Ambient	R_{thJA}	-	62	℃/W

Electrical Characteristics (T_J=25℃unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Static Characteristic						
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	1.5	2.5	
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	$R_{DS(on)}$	V_{GS}=10V, I_D=9A	-	15.6	21	mΩ
Dynamic Characteristic						
Input Capacitance	C_{iss}	V_{GS}=0V,	-	716	-	pF
Output Capacitance	C_{oss}	V_{DS}=20V,	-	78	-	
Reverse Transfer Capacitance	C_{rss}	f=1MHz	-	63	-	
Gate Total Charge	Q_g	V_{GS}=10V,	-	20	-	nC
Gate-Source charge	Q_{gs}	V_{DS}=20V,	-	4	-	
Gate-Drain charge	Q_{gd}	I_D=5A	-	4	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V,	-	11	-	ns
Turn-on Rise Time	t_r	V_{DD}=20V,	-	9	-	
Turn-off Delay Time	$t_{d(off)}$	I_D=5A,	-	33	-	
Turn-off Fall Time	t_f	R_G=3Ω	-	17	-	
Body Diode Characteristic						
Body Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_{SD}=10A	-	-	1.2	V
Reverse Recovery Time	t_{rr}	I_F=10A,	-	23	-	ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt=100A/us	-	11	-	nC

RATING AND CHARACTERISTIC CURVES

Figure1: Output Characteristics

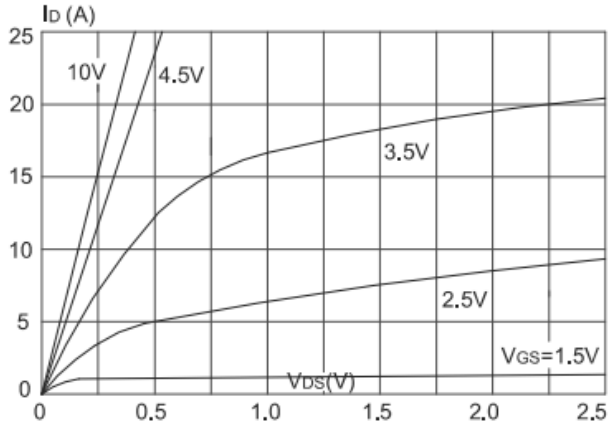


Figure 2: Typical Transfer Characteristics

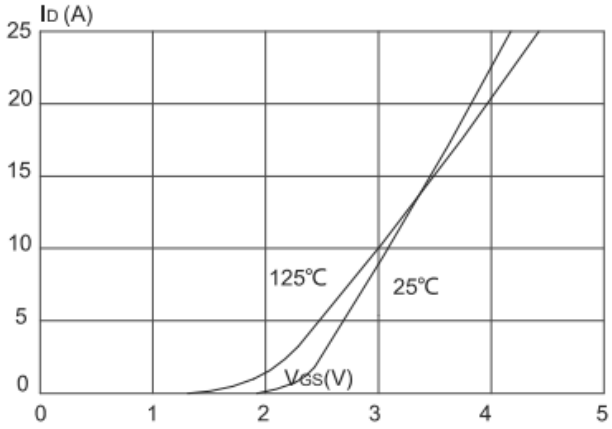


Figure 3: On-resistance vs. Drain Current

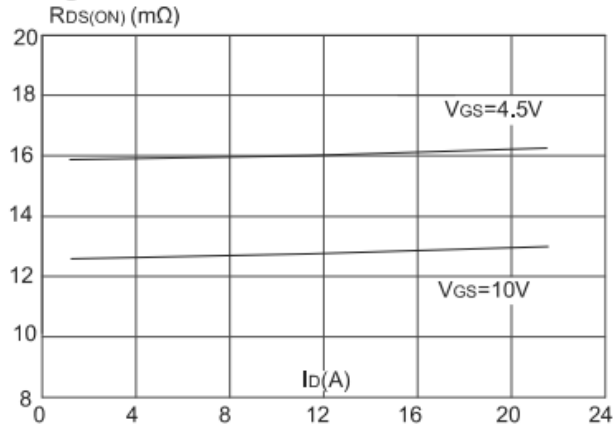


Figure 4: Body Diode Characteristics

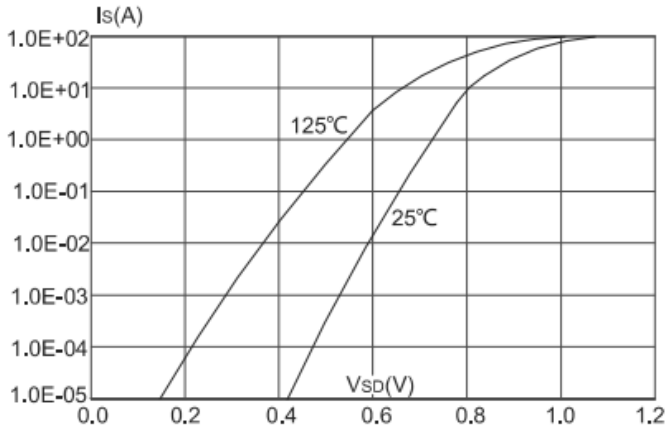


Figure 5: Gate Charge Characteristics

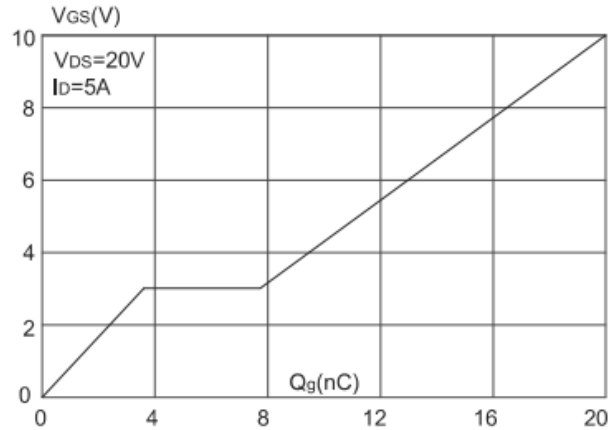
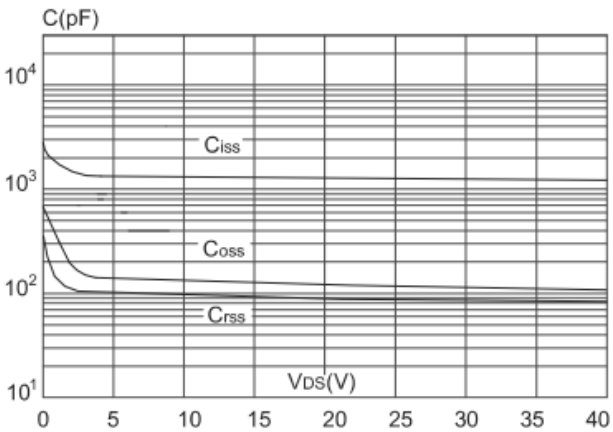


Figure 6: Capacitance Characteristics



RATING AND CHARACTERISTIC CURVES

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

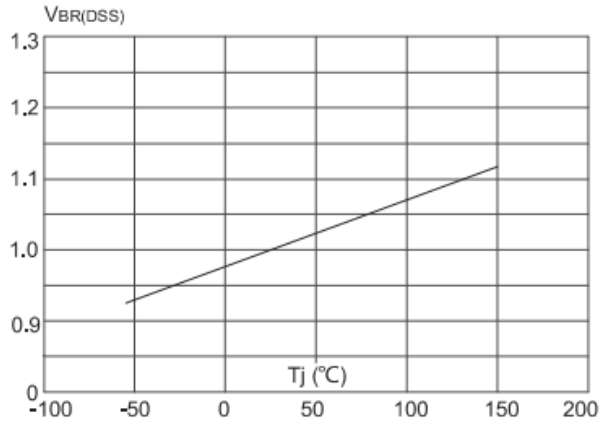


Figure 8: Normalized on Resistance vs. Junction Temperature

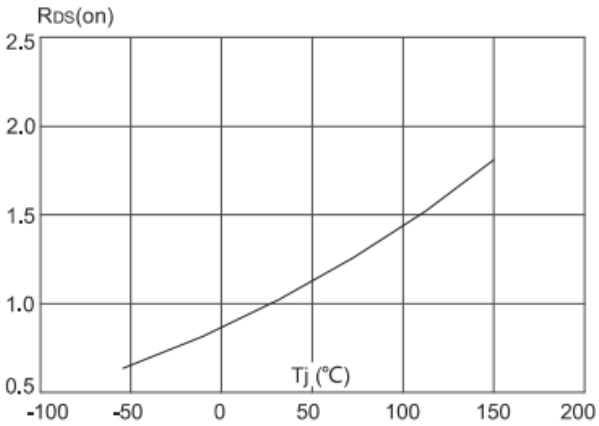


Figure 9: Maximum Safe Operating Area

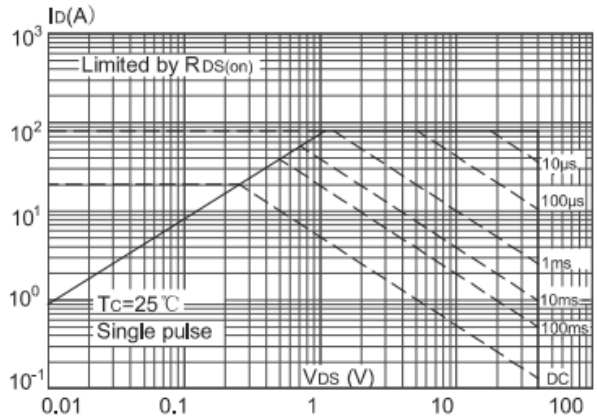


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

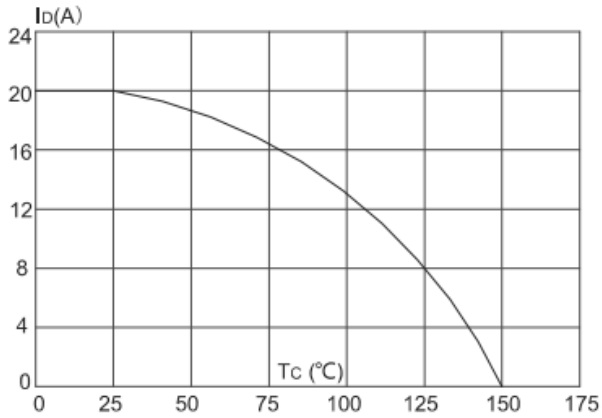
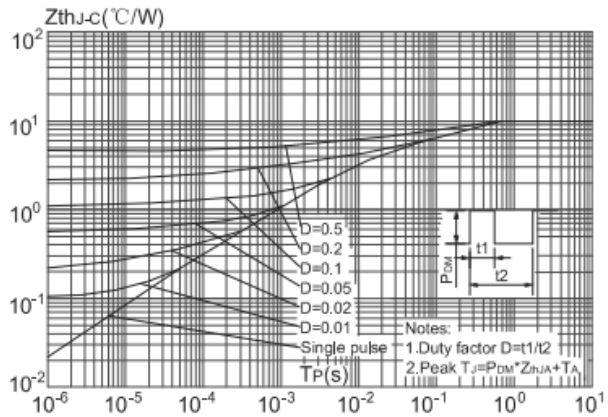
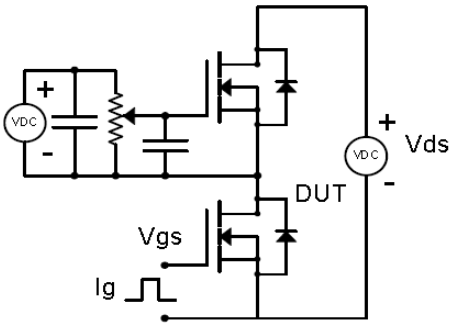


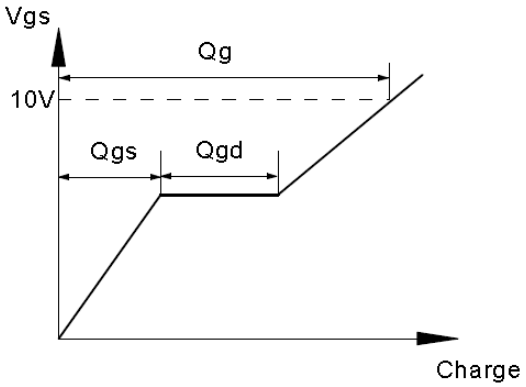
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



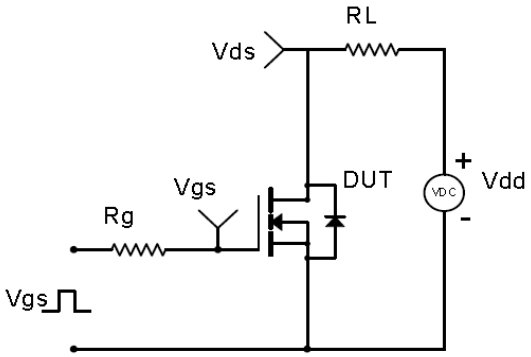
Test Circuit & Waveform

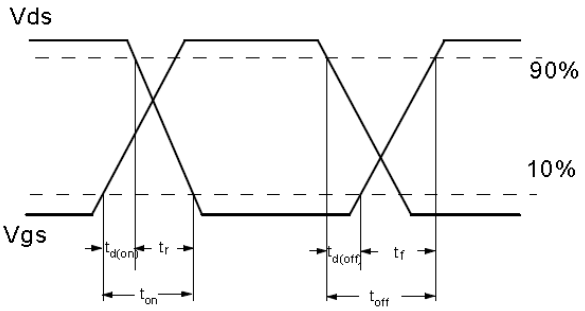
Gate Charge Test Circuit & Waveform



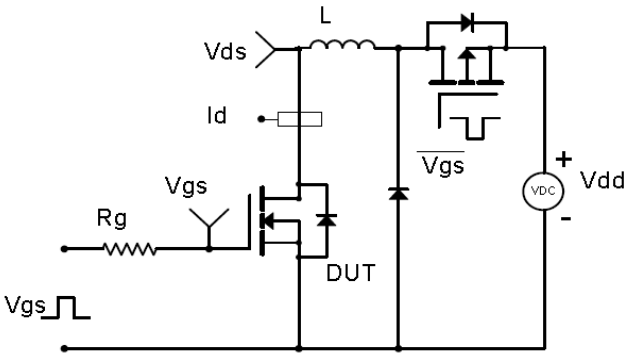


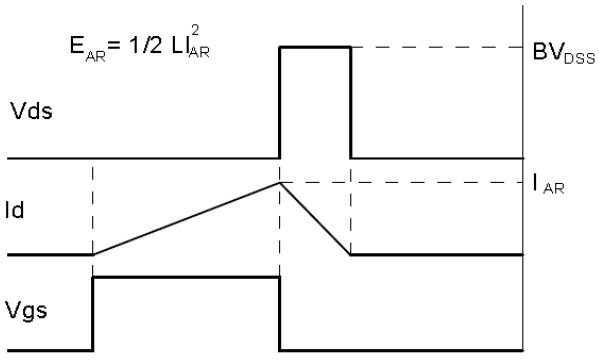
Resistive Switching Test Circuit & Waveforms



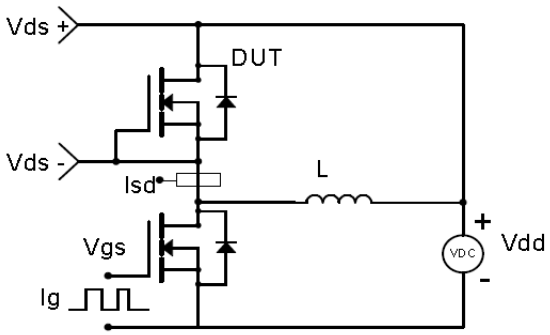


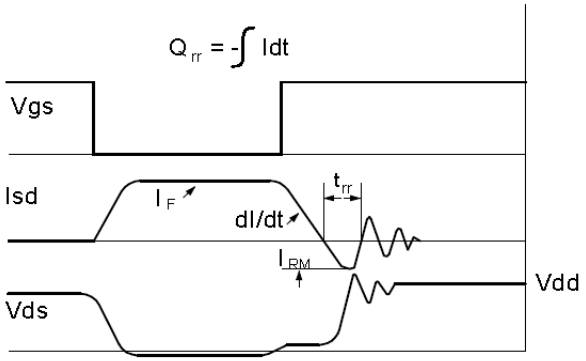
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms

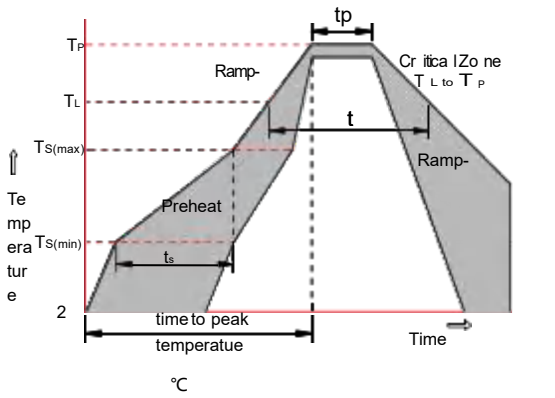




Soldering parameters

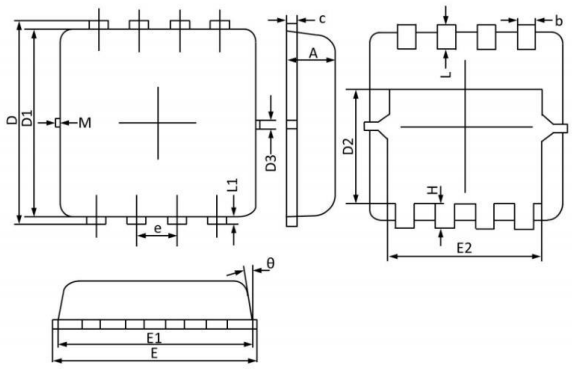
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid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

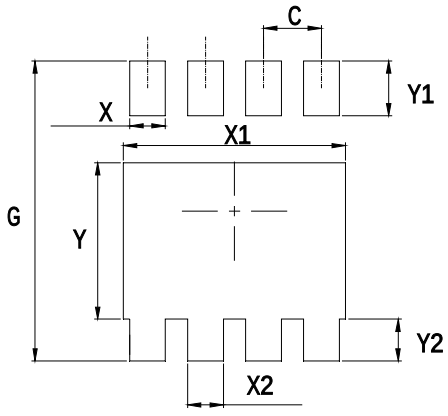
FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout

PDFN3X3 Package Information





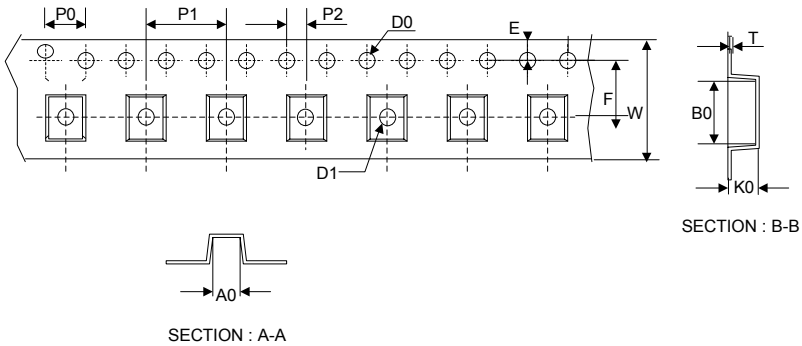
DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	b	0.25	0.30	0.35
C	0.10	0.15	0.25	D	3.25	3.35	3.45
D1	3.00	3.10	3.20	D2	1.78	1.88	1.98
D3	--	0.13	--	E	3.20	3.30	3.40
E1	3.00	3.15	3.20	E2	2.39	2.49	2.59
e	0.65BSC			H	0.30	0.39	0.50
L	0.30	0.40	0.50	L1	--	0.13	--
θ	--	10°	12°	M	*	*	0.15

Dimensions	Value (in mm)
C	0.65
G	3.60
X	0.40
X1	2.60
X2	0.40
Y	1.95
Y1	0.62
Y2	0.55

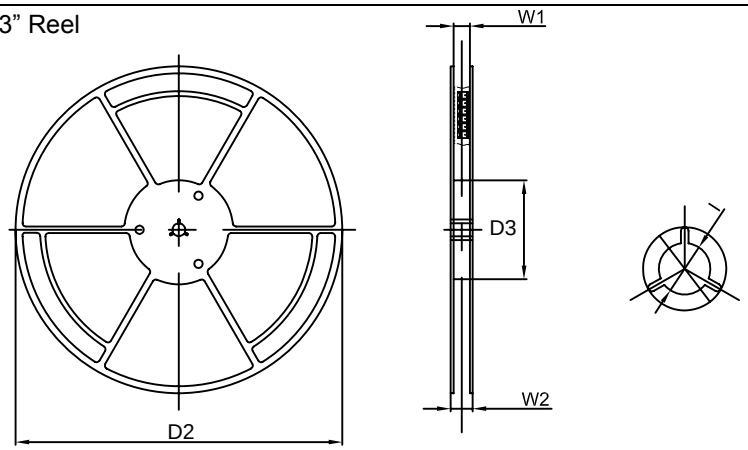
Tape & rell specification

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	3.90±0.20
B0	3.80±0.20
K0	1.20±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