SGMNQ90540
40V, Power, Single N-Channel, PDFN Package, MOSFET

FEATURES

- **Low On-State Resistance**
- **Low Total Gate Charge and Capacitance Losses**
- **Small Footprint (5×6mm²) for Compact Design**
- **Halogen-Free/RoHS Compliant**

PRODUCT SUMMARY

R_{DSON} (TYP) V_{GS} = 10V	R_{DSON} (MAX) V_{GS} = 10V	I_D (MAX) T_C = +25℃
0.72mΩ	0.94mΩ	320A

ABSOLUTE MAXIMUM RATINGS

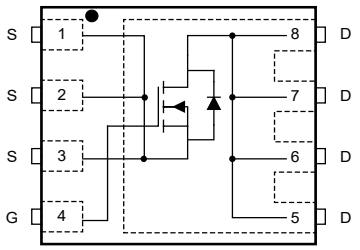
PARAMETER		SYMBOL	VALUE	UNITS
Drain-to-Source Voltage		V_{DS}	40	V
Gate-to-Source Voltage		V_{GS}	±20	V
Drain Current (1)	T_A = +25℃	I_D	44	A
	T_A = +70℃		35	
	T_C = +25℃		320	
	T_C = +100℃		202	
Drain Current (Pulse) (2)		I_{DM}	900	A
Total Dissipation	T_A = +25℃	P_D	2.5	W
	T_A = +70℃		1.6	
	T_C = +25℃		131	
	T_C = +100℃		52	
Avalanche Current (3)		I_{AS}	97	A
Avalanche Energy (3)		E_{AS}	470.45	mJ
Junction Temperature		T_J	+150	℃
Storage Temperature Range		T_{STG}	-55 to +150	℃
Lead Temperature (Soldering, 10s)			+260	℃

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

NOTES:
1. The current will be limited by PCB, thermal design and operating temperature.
2. t_{PLUSE} < 10μs
3. Parts are 100% tested at V_{GS} = 10V, I_L = 69A, E_{AS} = 238.05mJ

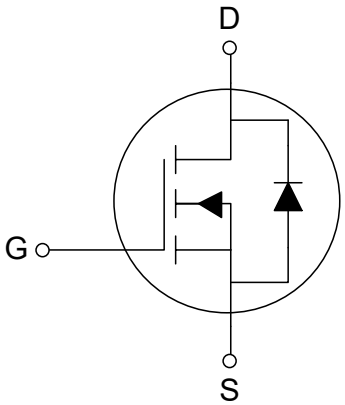
PIN CONFIGURATION

(TOP VIEW)



PDFN-5×6-8CL

EQUIVALENT CIRCUIT



APPLICATIONS

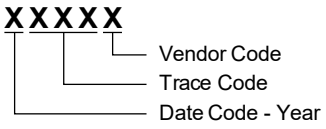
Power Tool
Brushless DC Motor Control
Hotswap/In-Rush Current Management
DC/DC Converters
Power Load Switch and eFuse

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGMNQ90540	PDFN-5×6-8CL	-55℃ to +150℃	SGMNQ90540TPDA8G/TR	SGM0T4 TPDA8 XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

THERMAL RESISTANCE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNITS
Junction-to-Ambient Thermal Resistance (1)	$R_{\theta JA}$	49	℃/W
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	0.95	℃/W

NOTE: 1. $R_{\theta JA}$ is determined with the device mounted on one square inch of copper pad, 2oz copper on FR4 board.

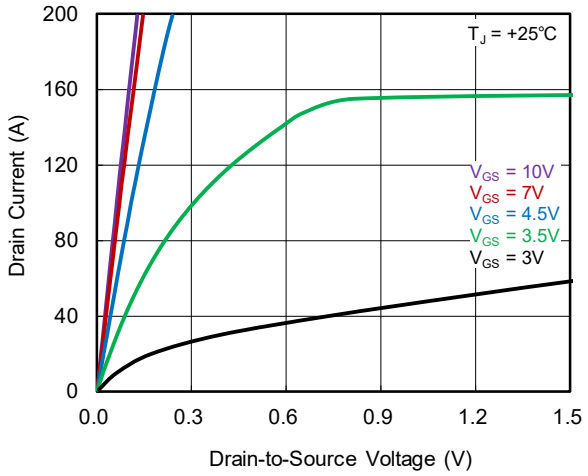
ELECTRICAL CHARACTERISTICS

(T_A = +25℃, unless otherwise noted.)

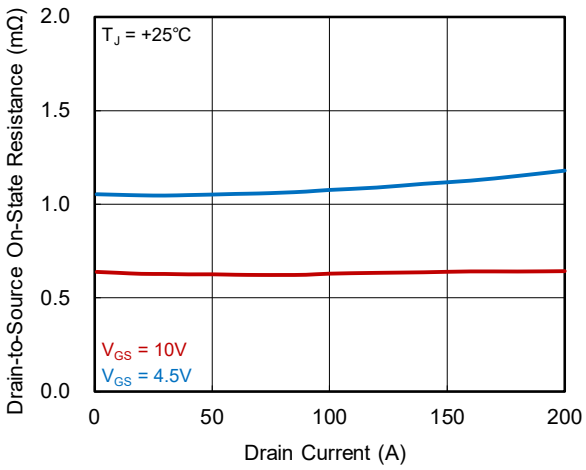
PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Static OFF Characteristics							
Drain-to-Source Breakdown Voltage	V_{BR_DSS}	V_{GS} = 0V, I_D = 250μA		40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0V, V_{DS} = 32V				10	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V				±100	nA
Static ON Characteristics							
Gate-to-Source Threshold Voltage	V_{GS_TH}	V_{GS} = V_{DS}, I_D = 250μA		1.2	1.6	2.2	V
Drain-to-Source On-State Resistance	R_{DSON}	V_{GS} = 10V, I_D = 50A			0.72	0.94	mΩ
		V_{GS} = 4.5V, I_D = 50A			1.05	1.47	
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D = 50A			103		S
Gate Resistance	R_G	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz			1.6		Ω
Diode Characteristics							
Diode Forward Voltage	V_{F_SD}	V_{GS} = 0V, I_S = 50A			0.7		V
Reverse Recovery Time	t_{RR}	V_{GS} = 0V, I_S = 50A, di/dt = 100A/μs			73		ns
Reverse Recovery Charge	Q_{RR}				125		nC
Dynamic Characteristics							
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz			5385		pF
Output Capacitance	C_{OSS}				1562		
Reverse Transfer Capacitance	C_{RSS}				49		
Total Gate Charge	Q_g	V_{DS} = 20V, I_D = 50A	V_{GS} = 10V		102		nC
			V_{GS} = 4.5V		52		
Gate-to-Source Charge	Q_{GS}	V_{GS} = 4.5V, V_{DS} = 20V, I_D = 50A			16		nC
Gate-to-Drain Charge	Q_{GD}				20		
Switch Characteristics							
Turn-On Delay Time	t_{D_ON}	V_{GS} = 10V, V_{DS} = 20V, I_D = 50A, R_G = 3Ω			13		ns
Rise Time	t_R				52		
Turn-Off Delay Time	t_{D_OFF}				63		
Fall Time	t_F				78		

TYPICAL PERFORMANCE CHARACTERISTICS

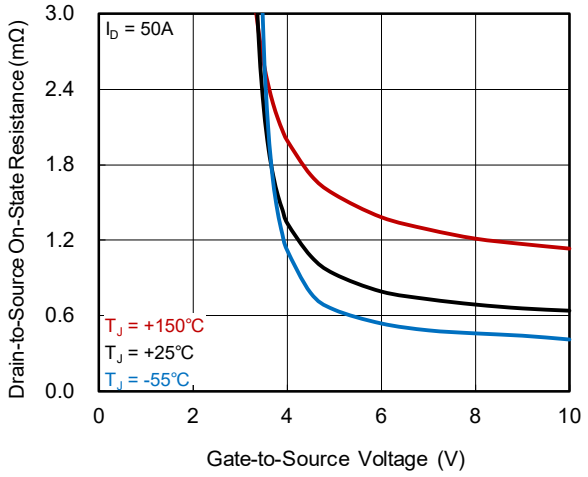
Output Characteristics



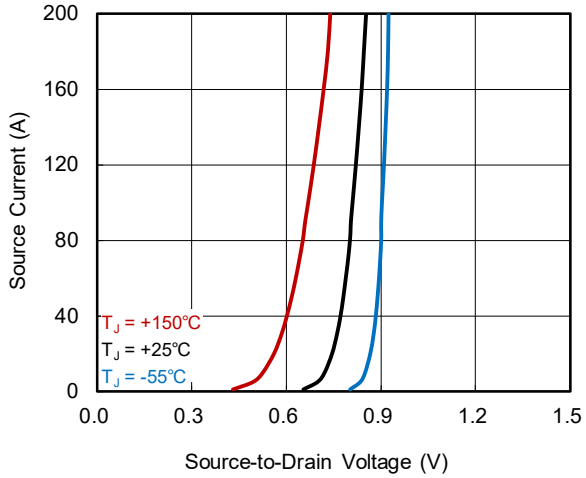
Drain-to-Source On-State Resistance vs. Drain Current



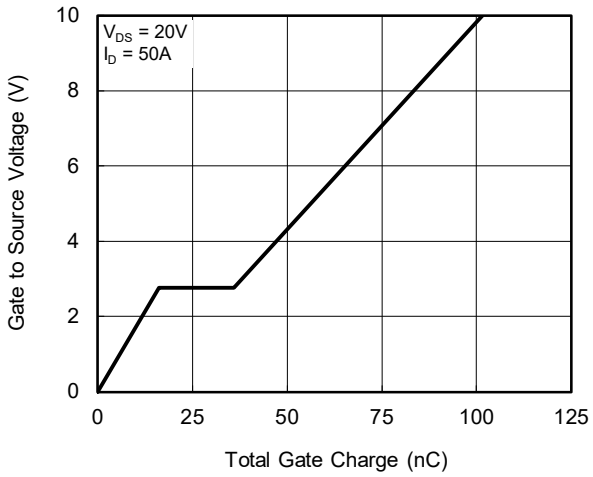
Drain-to-Source On-State Resistance vs. Gate-to-Source Voltage



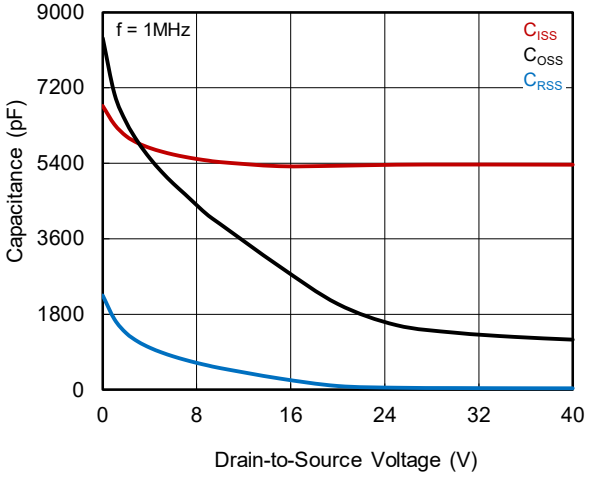
Diode Forward



Gate Charge Characteristics

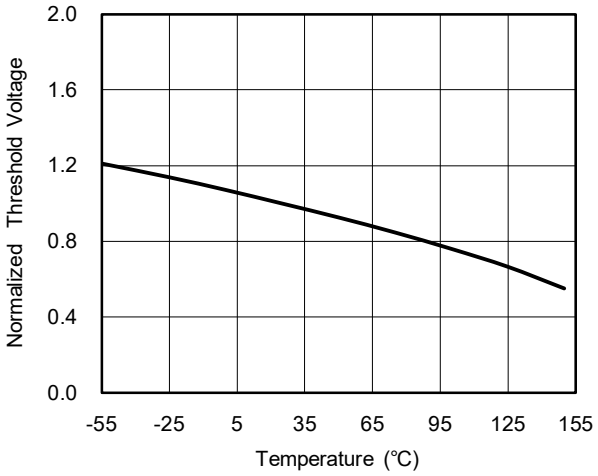


Capacitance Characteristics

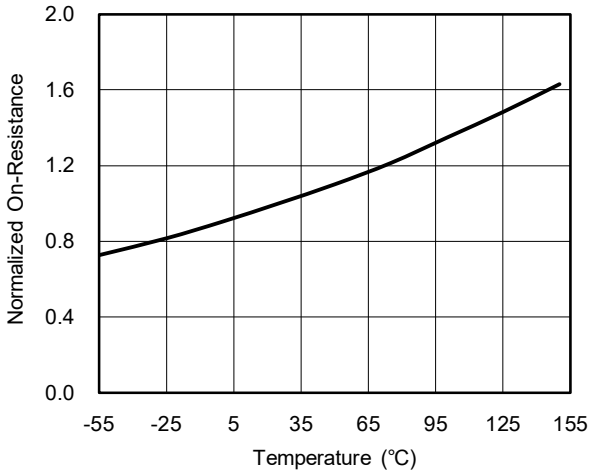


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

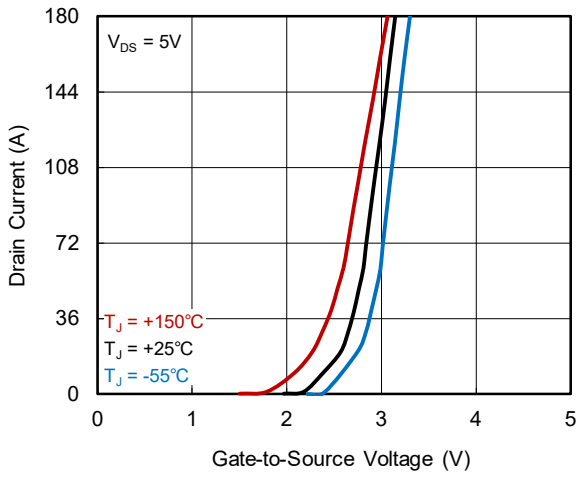
Normalized Threshold Voltage vs. Junction Temperature



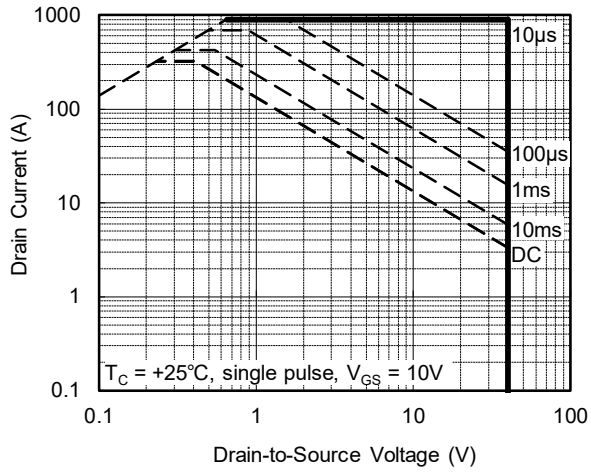
Normalized On-Resistance vs. Junction Temperature



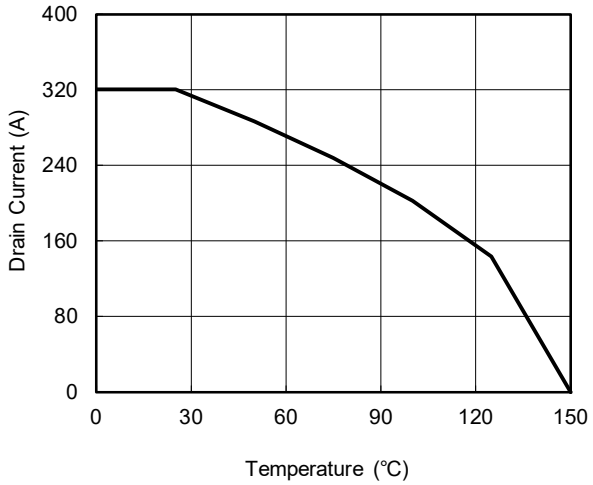
Transfer Characteristics



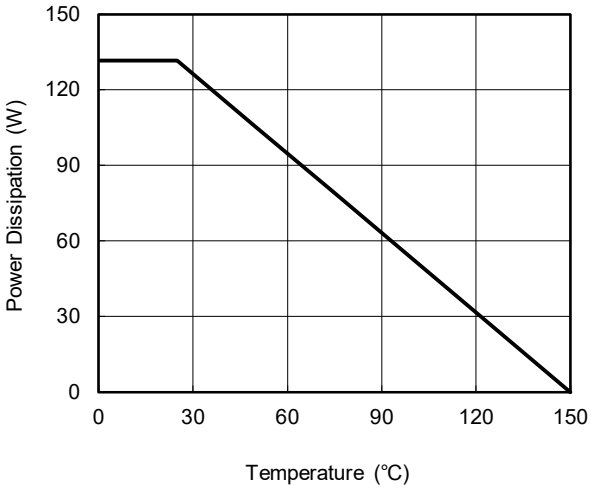
Safe Operating Area



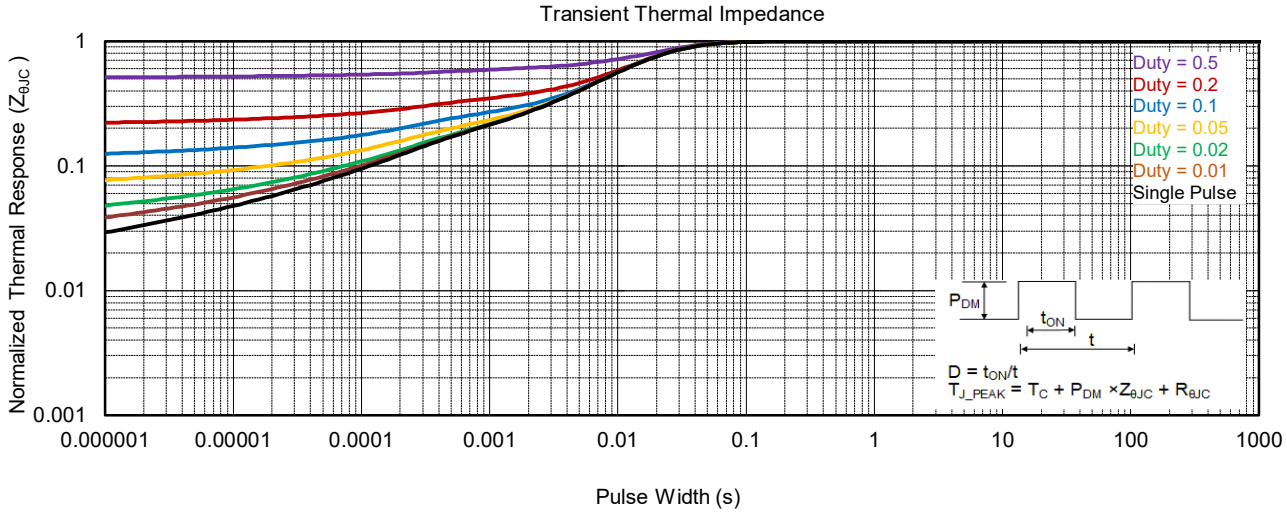
Drain Current vs. Junction Temperature



Power Dissipation vs. Junction Temperature



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



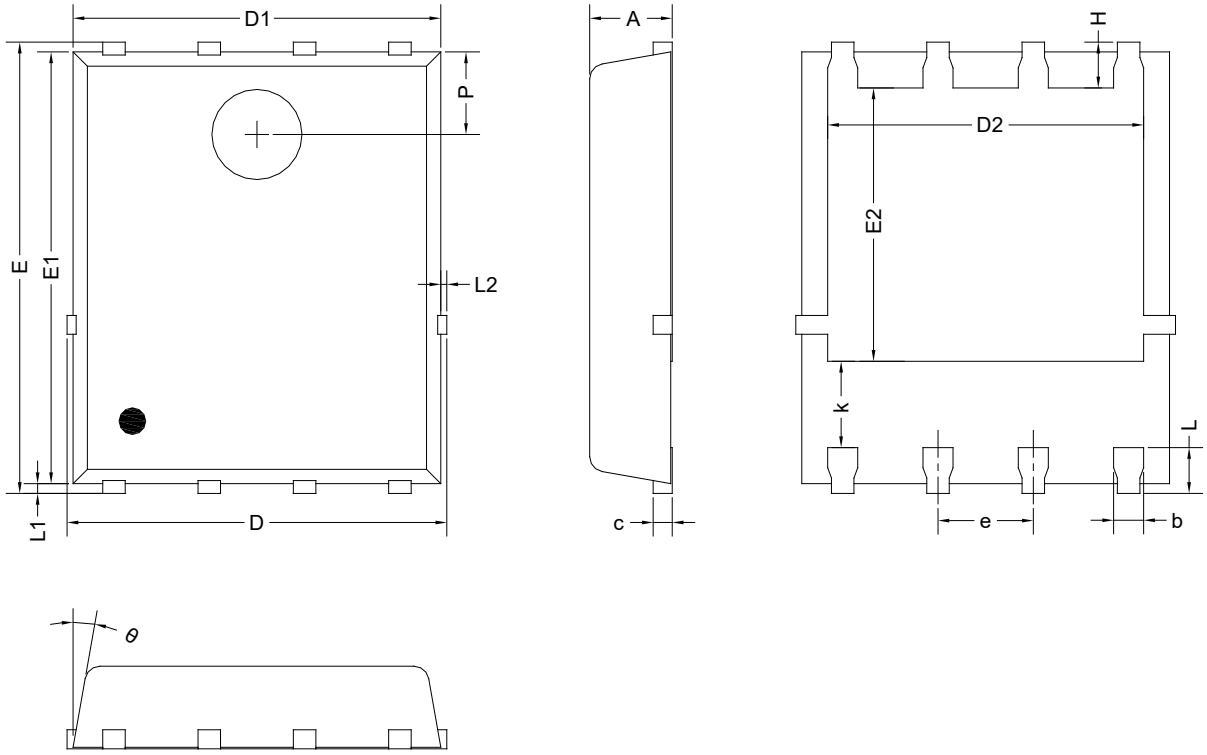
REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (NOVEMBER 2024) to REV.A	Page
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

PDFN-5×6-8CL

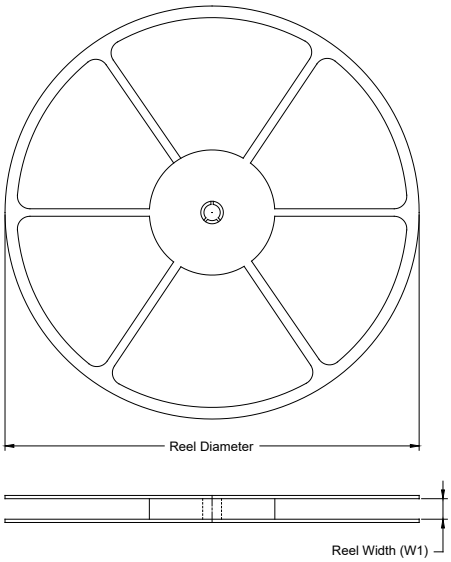


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.000	1.100	1.200
b	0.350	0.400	0.450
c	0.210	0.250	0.340
D	4.800	-	5.100
D1	4.800	4.900	5.000
D2	4.110	4.210	4.310
E	5.900	6.000	6.100
E1	5.700	5.750	5.800
E2	3.540	3.640	3.740
e	1.270 BSC		
H	0.510	0.610	0.710
k	1.100	-	-
L	0.510	0.610	0.710
L1	0.060	0.130	0.200
L2	-	-	0.100
P	1.000	1.100	1.200
θ	8°	10°	12°

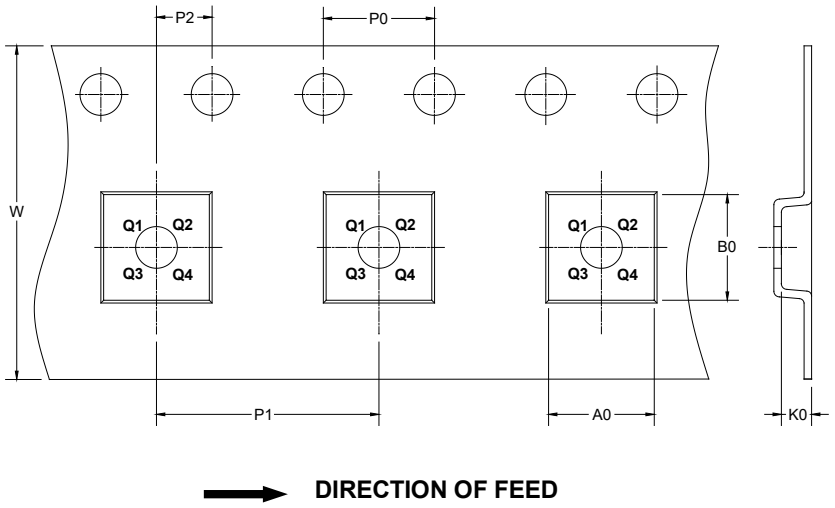
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



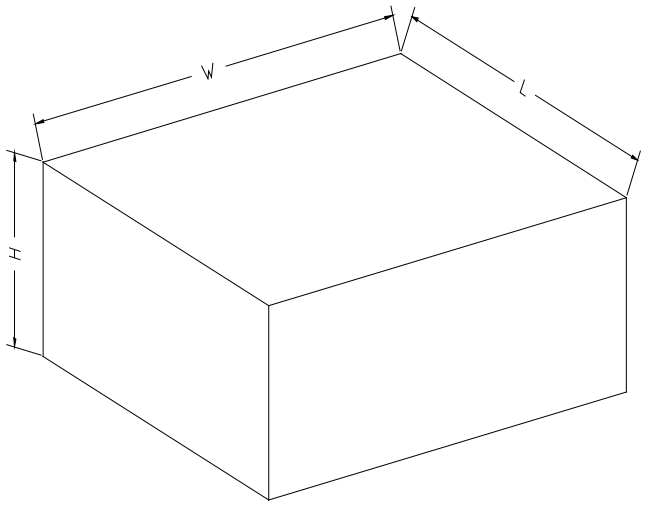
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
PDFN-5×6-8CL	13"	12.4	6.45	5.30	1.40	4.0	8.0	2.0	12.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13″	386	280	370	5

DD0002