

B2D04065D

650V ▲ 4A ▲ SiC SCHOTTKY DIODE

SILICON CARBIDE SiC SCHOTTKY DIODE ▲ SMD type
 Excellent surge capability
 Easy paralleling due to positive V_F temperature coefficient
 Flat DFN 5x6 package ▲ Epoxy meets UL94-V0 ▲ MSL3
 Temperature independent switching
Ultra-low forward voltage and high surge current

SPECIFICATION

Item ($T_C = 25^\circ\text{C}$, unless otherwise noted)		Characteristics
Operating Temperature Range	T_J	-55°C to $+175^\circ\text{C}$
Storage Temperature Range	T_S	-55°C to $+175^\circ\text{C}$
Repetitive Peak Reverse Voltage	V_{RRM}	650V
Continuous Forward Current at $T_C = 155^\circ\text{C}$	I_F	4A
Total Capacitive Charge ($T_J = 25^\circ\text{C}$)	Q_C	12nC
Capacitance Stored Energy ($V_R = 400\text{V}$)	E_C	$3\mu\text{J}$
Diode Forward Voltage ($T_J = 175^\circ\text{C}$, $I_F = 4\text{A}$)	V_F	1.7V
Power Dissipation	P_{TOT}	61W

APPLICATIONS

EV Charging	Industrial Inverters	Motors & Drives	Power Factor Correction	Renewable Energy	SMPS	UPS

PIN DESCRIPTION

Circuit Diagram	Outline - Bottom View	Pin No.	Description
		1 2 3 4 5 6 7 8	Cathode Cathode Cathode Cathode Anode Anode Anode Anode

ABSOLUT MAXIMUM RATINGS ▲ $T_C = 25^\circ\text{C}$, unless otherwise noted

Item	Condition	Symbol		Unit
Repetitive Peak Reverse Voltage		V_{RRM}	650	V
Non-Repetitive Peak Reverse Voltage		V_{RSM}	650	V
Continuous Forward Current	$T_C = 25^\circ\text{C}$	I_F	15	A
Continuous Forward Current	$T_C = 155^\circ\text{C}$	I_F	4	A
Non-Repetitive Forward Surge Current	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ms}$, Half Sine Wave	I_{FSM}	32	A
I^2t Value	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ms}$	$\int i^2 dt$	5.12	A^2s
Power Dissipation	$T_C = 25^\circ\text{C}$	P_{TOT}	61	W
Power Dissipation	$T_C = 110^\circ\text{C}$	P_{TOT}	26	W
Operating Junction Temperature		T_J	-55 to +175	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55 to +175	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Static Characteristics						
DC Blocking Voltage	$T_J = 25^\circ\text{C}$	V_{DC}	650			V
Diode Forward Voltage	$I_F = 4\text{A}$, $T_J = 25^\circ\text{C}$	V_F		1.40		V
Diode Forward Voltage	$I_F = 4\text{A}$, $T_J = 175^\circ\text{C}$	V_F		1.70		V
Reverse Current	$V_R = 650\text{V}$, $T_J = 25^\circ\text{C}$	I_R		1		μA
Reverse Current	$V_R = 650\text{V}$, $T_J = 175^\circ\text{C}$	I_R		10		μA

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
Total Capacitive Charge	$V_R = 400\text{V}$, $T_J = 25^\circ\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$	Q_C		12		nC
Total Capacitance	$V_R = 1\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		181		pF
Total Capacitance	$V_R = 300\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		21.6		pF
Total Capacitance	$V_R = 600\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		21.3		pF
Capacitance Stored Energy	$V_R = 400\text{V}$, $T_J = 25^\circ\text{C}$	E_C		3		μJ

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta,JC}$		2.430		K/W

REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 1 • Typical Forward Characteristics I_F vs. V_F

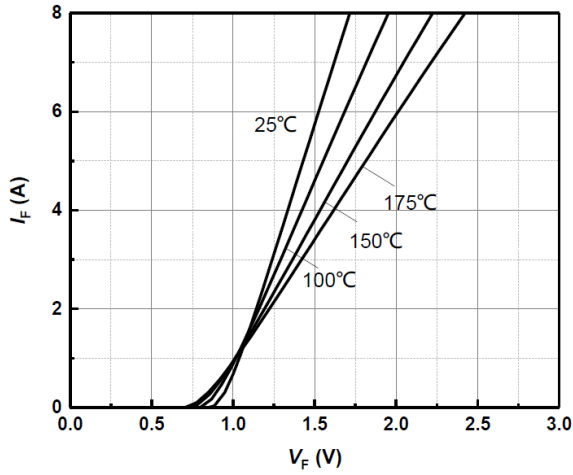


Fig. 2 • Typical Reverse Current I_R as function of Reverse Voltage V_R

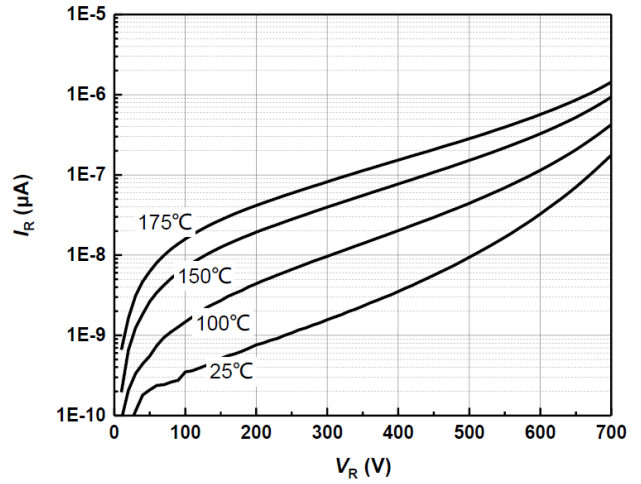


Fig. 3 • Diode Forward Current I_F as function of Case Temperature T_C ($D =$ Duty Cycle)

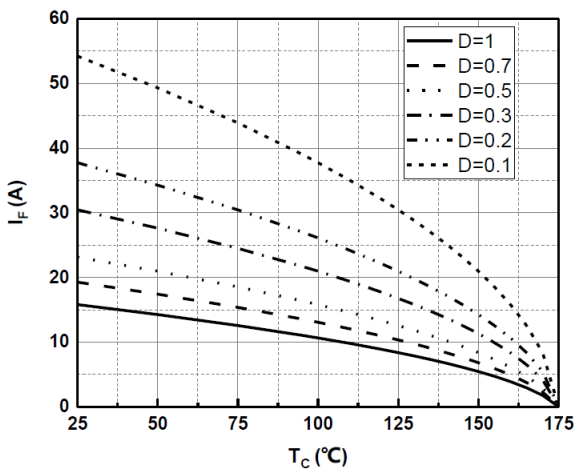


Fig. 4 • Typical Capacitance C as function of Reverse Voltage V_R , $C = f(V_R)$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$

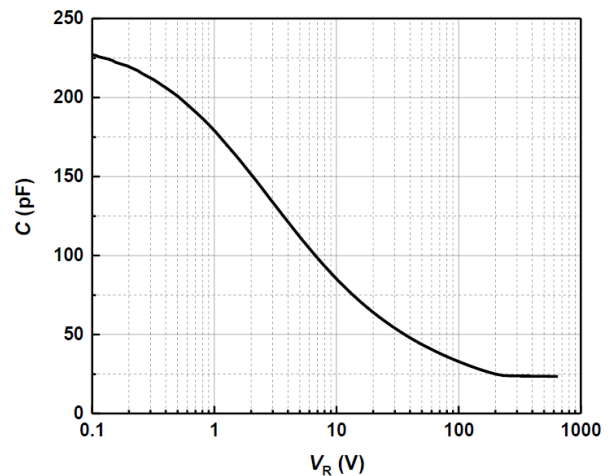


Fig. 5 • Typical Reverse Charge Q_C as function of Reverse Voltage V_R

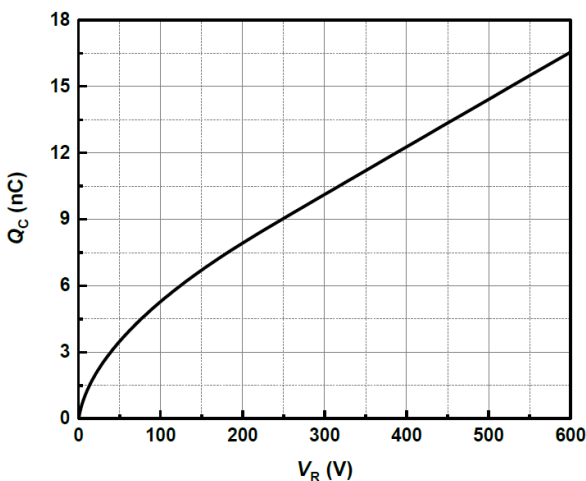
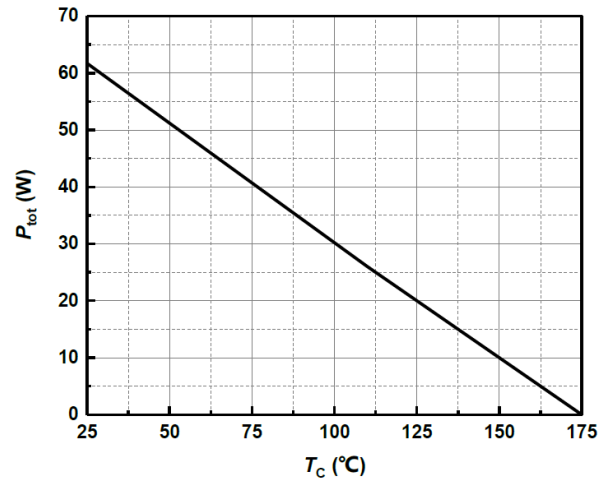


Fig. 6 • Power Dissipation P_{TOT} as function of Case Temperature T_C



REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 7 - Capacitance Stored Energy

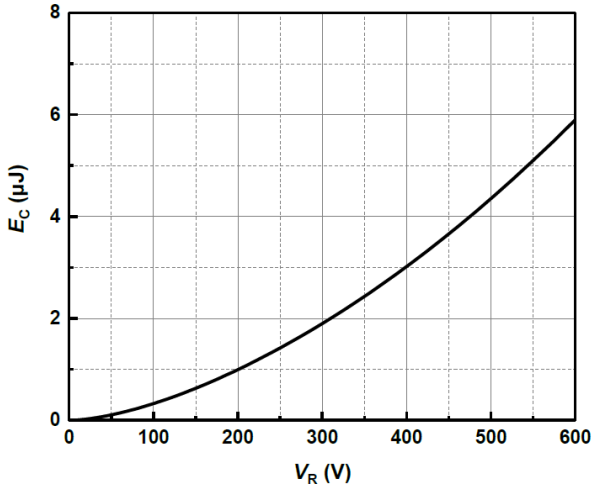
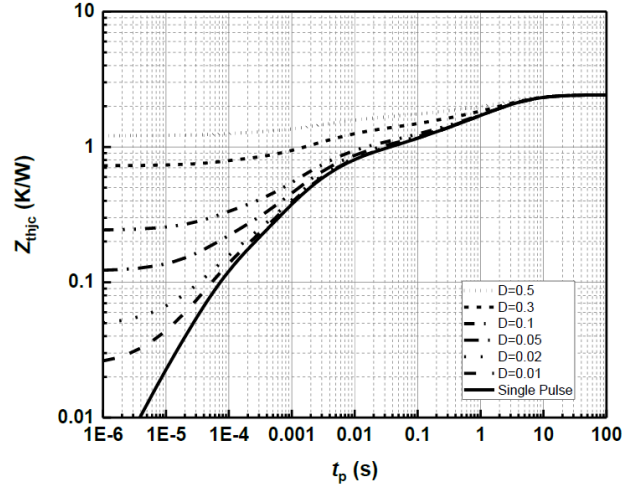
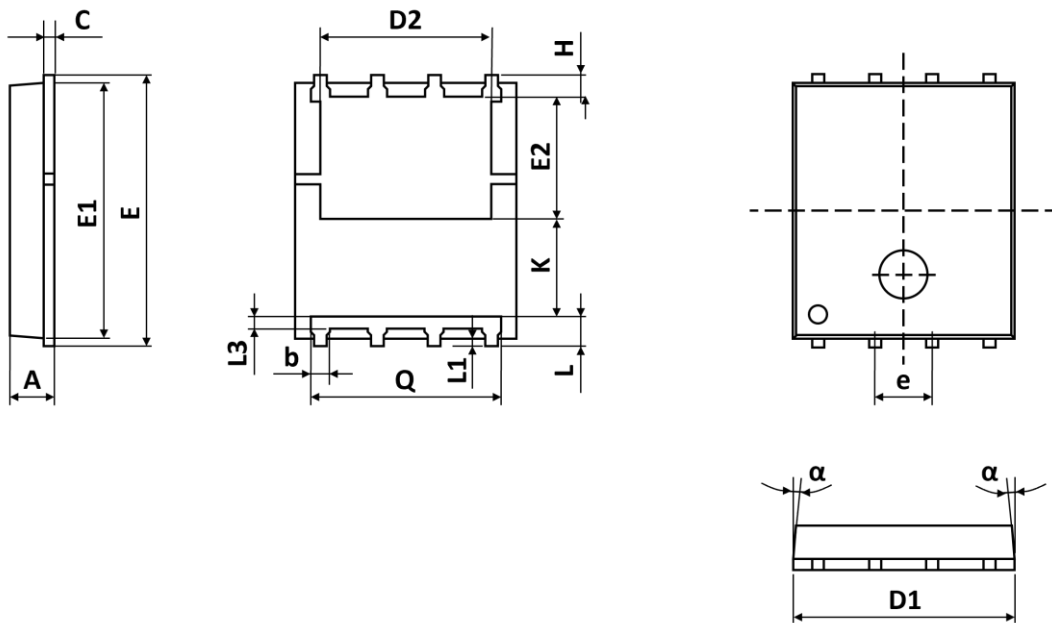


Fig. 8 - Maximum Transient Thermal Impedance, $Z_{thjc} = f(t)$, Parameter: $D = t/T$



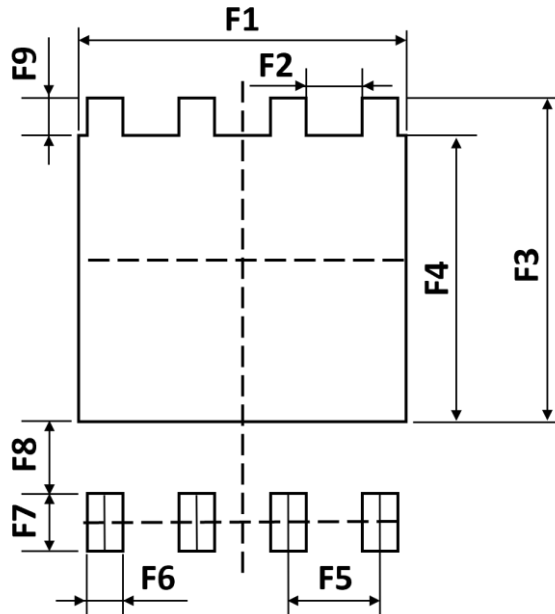
PACKAGE OUTLINE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	0.90	1.00	1.10
A1	0.00	-	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	2.66	2.76	2.86

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
e	1.27 BSC		
H	0.41	0.51	0.61
K	2.00	2.10	2.20
L	0.53	0.63	0.73
L1	0.06	0.13	0.20
L3	0.15	0.25	0.35
Q	4.12	4.22	4.32
α	0°	-	12°

RECOMMENDED PAD LAYOUT



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)	Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	4.52	-	F6	-	0.51	-
F2	-	0.76	-	F7	-	0.76	-
F3	-	4.47	-	F8	-	1.02	-
F4	-	3.97	-	F9	-	0.50	-
F5	-	1.27	-				

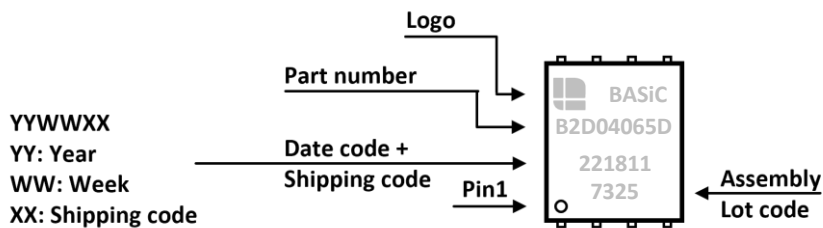
Notes:

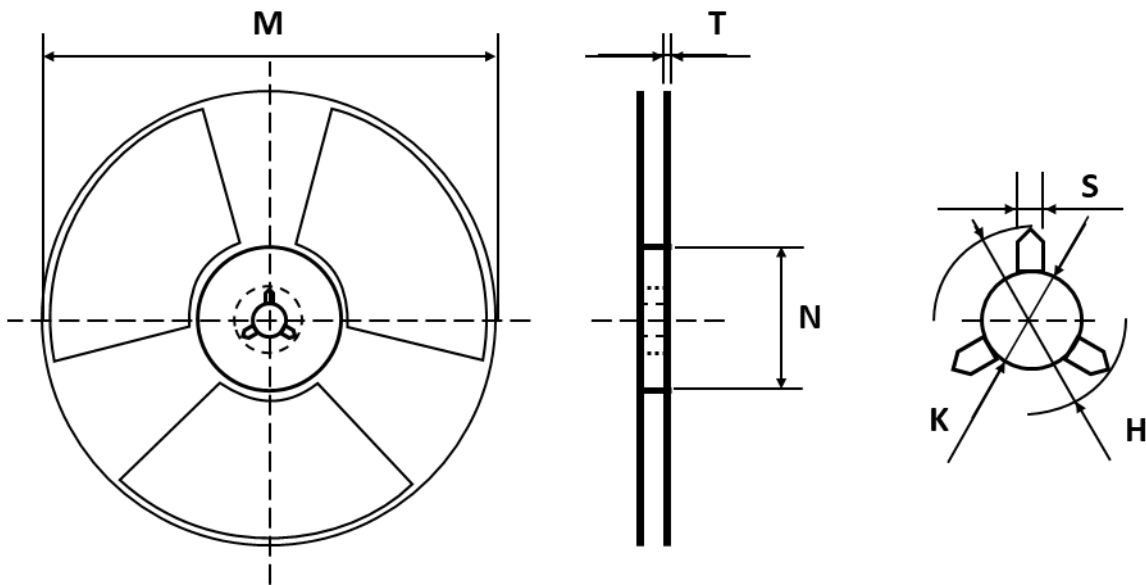
1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please reference document IPC-7351A.

ORDERING INFORMATION

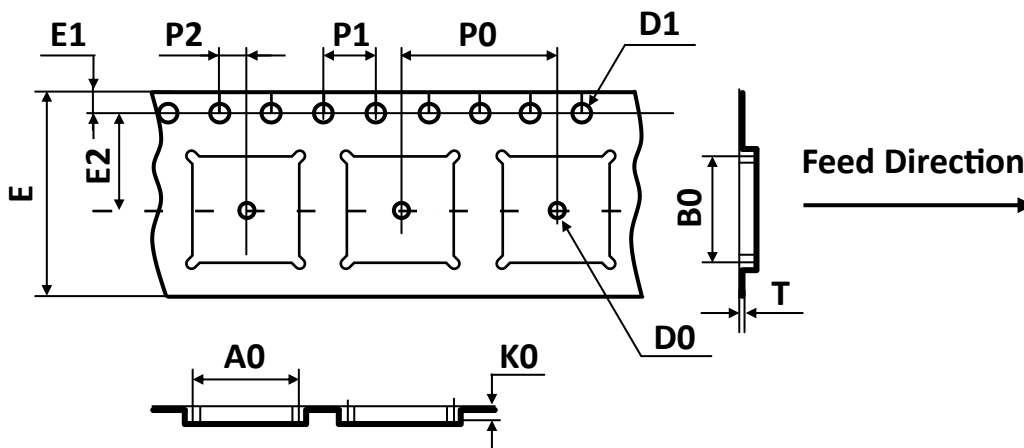
Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
B2D04065D	DFN 5x6	Reel	5,000pcs	10,000pcs	50,000pcs

PART MARKING



REEL DIMENSIONS ▲ All dimensions in mm


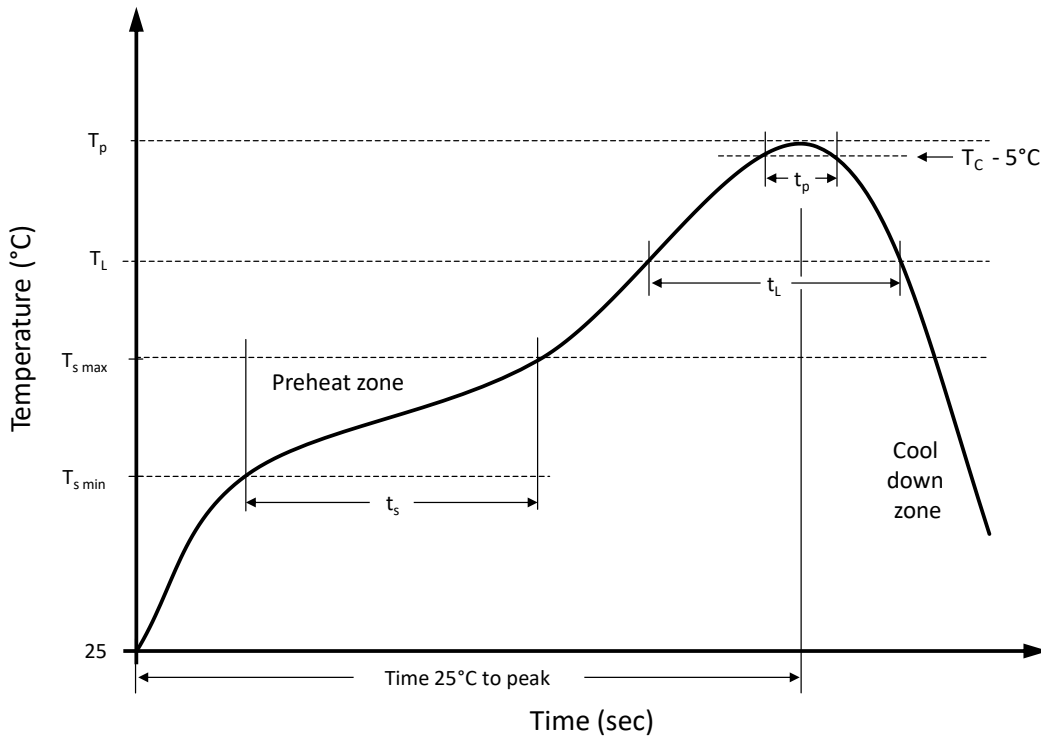
Tape Size	Reel Size	M	N	T	H	K	S
12mm	Ø330	Ø330.00	Ø102.00	2.00	13.00	10.50	2.00
		±0.20	±0.10	±2.0	+0.50 -0.20	±0.25	±0.25

TAPE DIMENSIONS ▲ All dimensions in mm


Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DFN 5x6	6.35	5.35	1.30	1.50	1.50	12.00	1.75	5.50	8.00	4.00	2.00	0.30
	±0.10	±0.10	±0.10	±0.10	±0.10	±0.30	±0.10	±0.10	±0.10	±0.10	±0.10	±0.05

Note: All dimensions meet EIA-481-D requirements.

RECOMMENDED REFLOW SOLDERING PROFILE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	$T_{s\ min}$	100 °C	150 °C
Preheat temperature max.	$T_{s\ max}$	150 °C	200 °C
Preheat time t_s from $T_{s\ min}$ to $T_{s\ max}$	t_s	120 seconds	120 seconds
Ramp-up rate (T_L to T_p)		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	T_L	183 °C	217 °C
Time t_L maintained above T_L	t_L	150 seconds max.	150 seconds max.
Peak package body temperature	T_p	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	t_p	20 seconds max.	30 seconds max.
Ramp-down rate (T_L to T_p)		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes

REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

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