

B2D04065V1

650V ▲ 4A ▲ SiC SCHOTTKY DIODE

SILICON CARBIDE SiC SCHOTTKY DIODE ▲ SMD type

Excellent surge capability

Easy paralleling due to positive V_F temperature coefficient

SMBF package ▲ Epoxy meets UL94V-0 ▲ MSL3

Temperature independent switching

Ultra-low forward voltage and high surge current



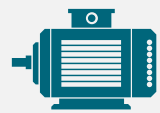




SPECIFICATION

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 $T_C = 135^\circ\text{C}$ ^{Note 1}	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	3μJ
Diode Forward Voltage ($T_J = 175^\circ\text{C}$, $I_F = 4\text{A}$)	V_F	1.5V
Power Dissipation ^{Note 1}	P_{TOT}	25W

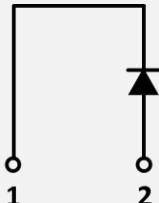
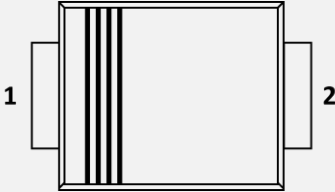
Notes:

1. This value is rated according to $R_{\theta JC}$

APPLICATIONS

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

PIN DESCRIPTION

Circuit Diagram	Outline - Top View	Pin No.	Description
		1 2	Cathode 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	$T_C = 25^{\circ}\text{C}$ Note 1	I_F	10	A
Continuous Forward Current	$T_{PCB} = 25^{\circ}\text{C}$ Note 2	I_F	6	A
Continuous Forward Current	$T_C = 135^{\circ}\text{C}$ Note 1	I_F	4	A
Continuous Forward Current	$T_{PCB} = 100^{\circ}\text{C}$ Note 2	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 Note 1	$T_C = 25^{\circ}\text{C}$	P_{TOT_CASE}	25	W
Power Dissipation Note 2	$T_C = 110^{\circ}\text{C}$	P_{TOT_CASE}	10	W
Power Dissipation Note 1	$T_C = 25^{\circ}\text{C}$	P_{TOT_PCB}	12	W
Power Dissipation Note 2	$T_C = 110^{\circ}\text{C}$	P_{TOT_PCB}	5	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		1.31	1.60	V
Diode Forward Voltage	$I_F = 4\text{A}$, $T_J = 175^{\circ}\text{C}$	V_F		1.50	2.00	V
Reverse Current	$V_R = 650\text{V}$, $T_J = 25^{\circ}\text{C}$	I_R		1	60	μA
Reverse Current	$V_R = 650\text{V}$, $T_J = 175^{\circ}\text{C}$	I_R		10	100	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		183		pF
Total Capacitance	$V_R = 300\text{V}$, $f = 1\text{MHz}$, $T_J = 25^{\circ}\text{C}$	C		21		pF
Total Capacitance	$V_R = 600\text{V}$, $f = 1\text{MHz}$, $T_J = 25^{\circ}\text{C}$	C		20.5		pF
Capacitance Stored Energy	$V_R = 400\text{V}$, $T_J = 25^{\circ}\text{C}$	E_C		3		μJ

Notes:

1. This value is rated according to $R_{\theta JC}$
2. This value is rated according to $R_{\theta PCB}$

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$		6		K/W
Thermal Resistance, Junction to PCB Note 3	$R_{\theta PCB}$		12.13		K/W

Notes:

3. When mounted on a 1-inch² FR-4, 2 Oz copper board, $t < 10\text{s}$

REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 1 • Typical Forward Characteristics I_F vs. V_F

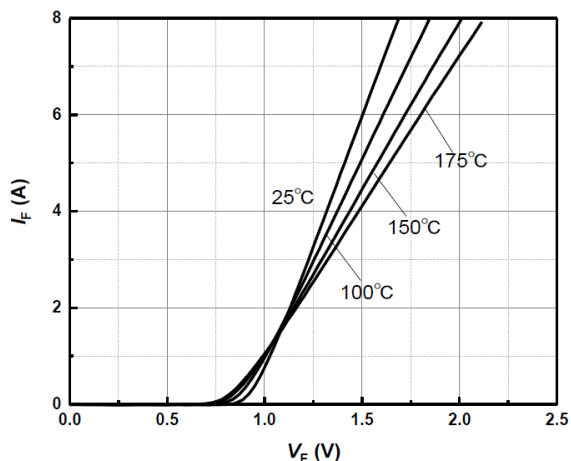


Fig. 2 • Typical Reverse Current I_R as function of Reverse Voltage V_R

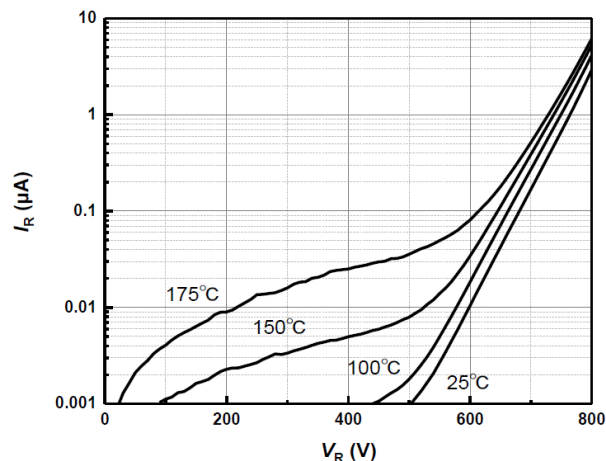


Fig. 3 • Diode Forward Current I_{F_PCB} as function of Case Temperature T_C (D = Duty Cycle)

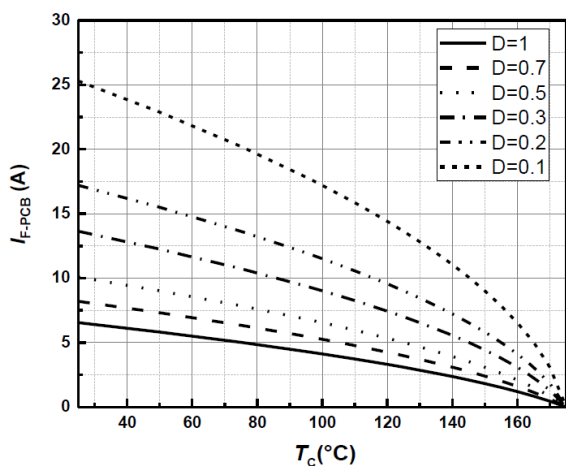


Fig. 4 • Diode Forward Current I_{F_CASE} as function of Case Temperature T_C (D = Duty Cycle)

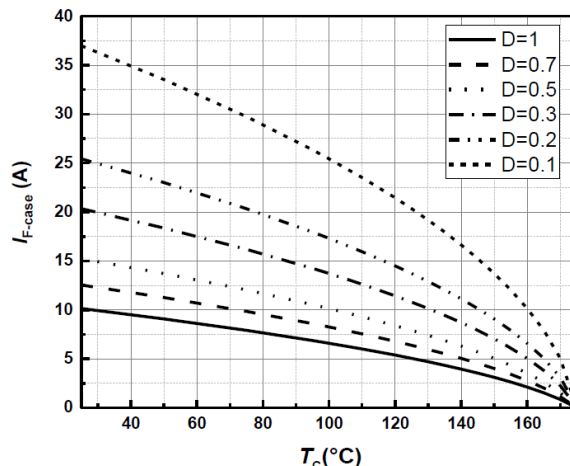


Fig. 5 • Typical Capacitance C as function of Reverse Voltage V_R , $C = f(V_R)$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$

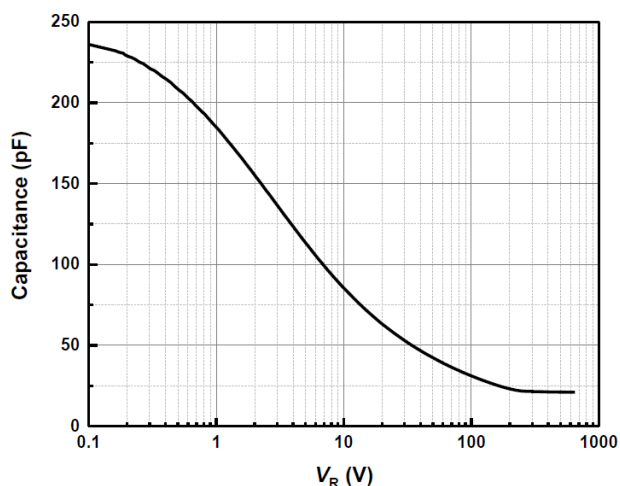
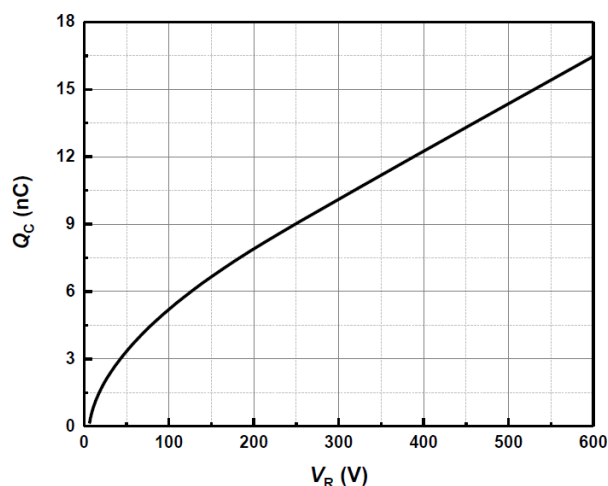


Fig. 6 • Typical Reverse Charge Q_C as function of Reverse Voltage V_R



REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 7 • Power Dissipation P_{TOT_PCB} as function of Case Temperature T_C

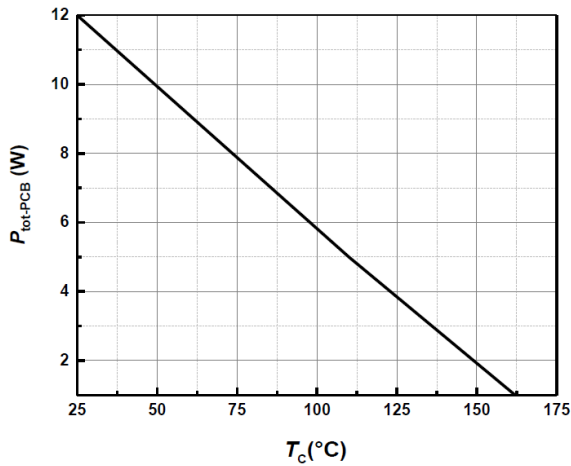


Fig. 8 • Power Dissipation P_{TOT_PCB} as function of Case Temperature T_C

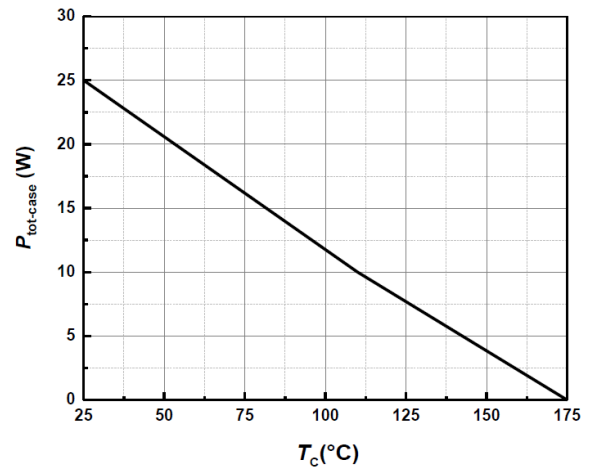


Fig. 9 • Capacitance Stored Energy

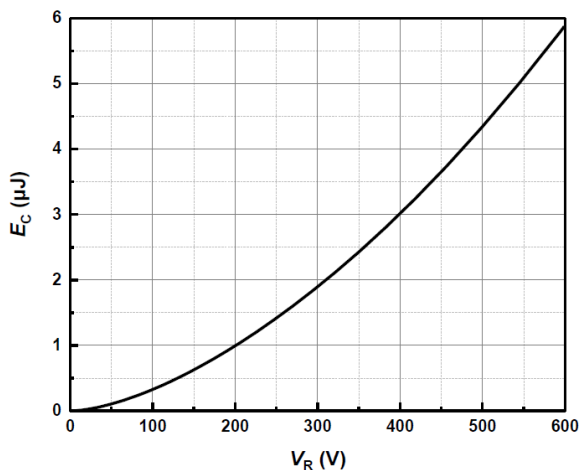


Fig. 10 • Maximum Transient Thermal Impedance, $Z_{thjc_PCB} = f(t)$, Parameter: $D = t/T$

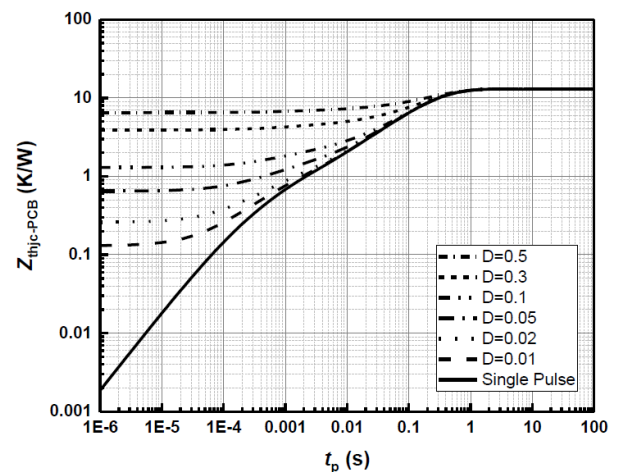
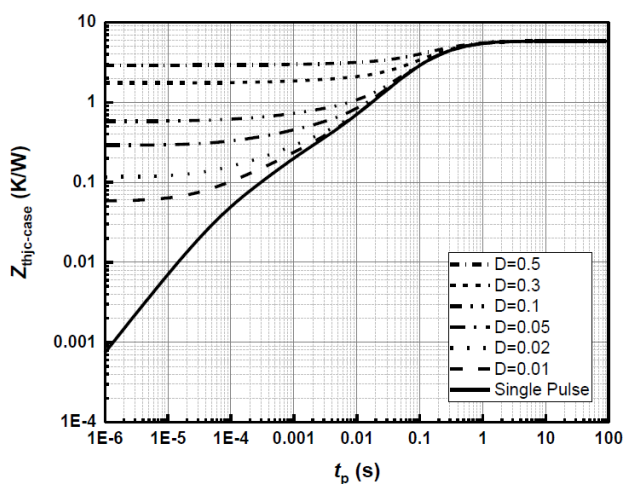
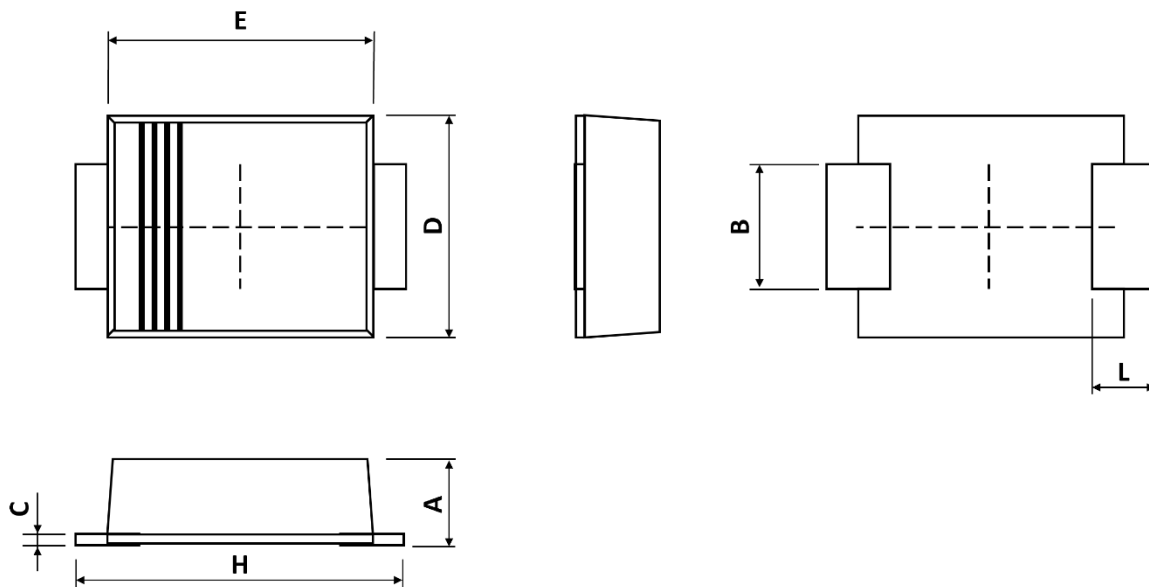


Fig. 11 • Maximum Transient Thermal Impedance, $Z_{thjc_Case} = f(t)$, Parameter: $D = t/T$



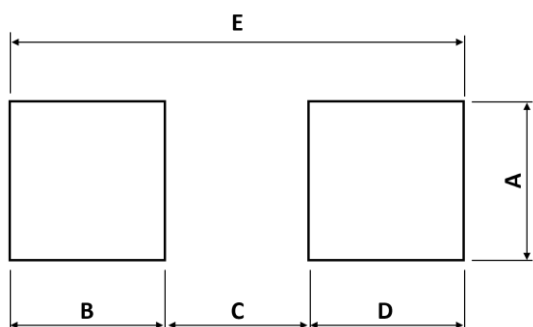
PACKAGE OUTLINE ▲ SMBF PACKAGE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	1.30	1.35	1.40
B	1.98	2.00	2.02
C	0.12	0.15	0.18
D	3.55	3.60	3.65

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E	4.25	4.30	4.35
H	5.20	5.30	5.40
L	0.70	-	1.02

RECOMMENDED PAD LAYOUT



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	2.20	-	-
B	1.90	-	-
C	-	-	2.40
D	1.90	-	-
E	6.20 REF		

Notes:

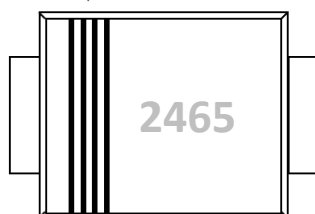
1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please reference document IPC-7351A.

ORDERING INFORMATION

Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
B2D04065V1	SMBF	Reel	5,000pcs	10,000pcs	50,000pcs

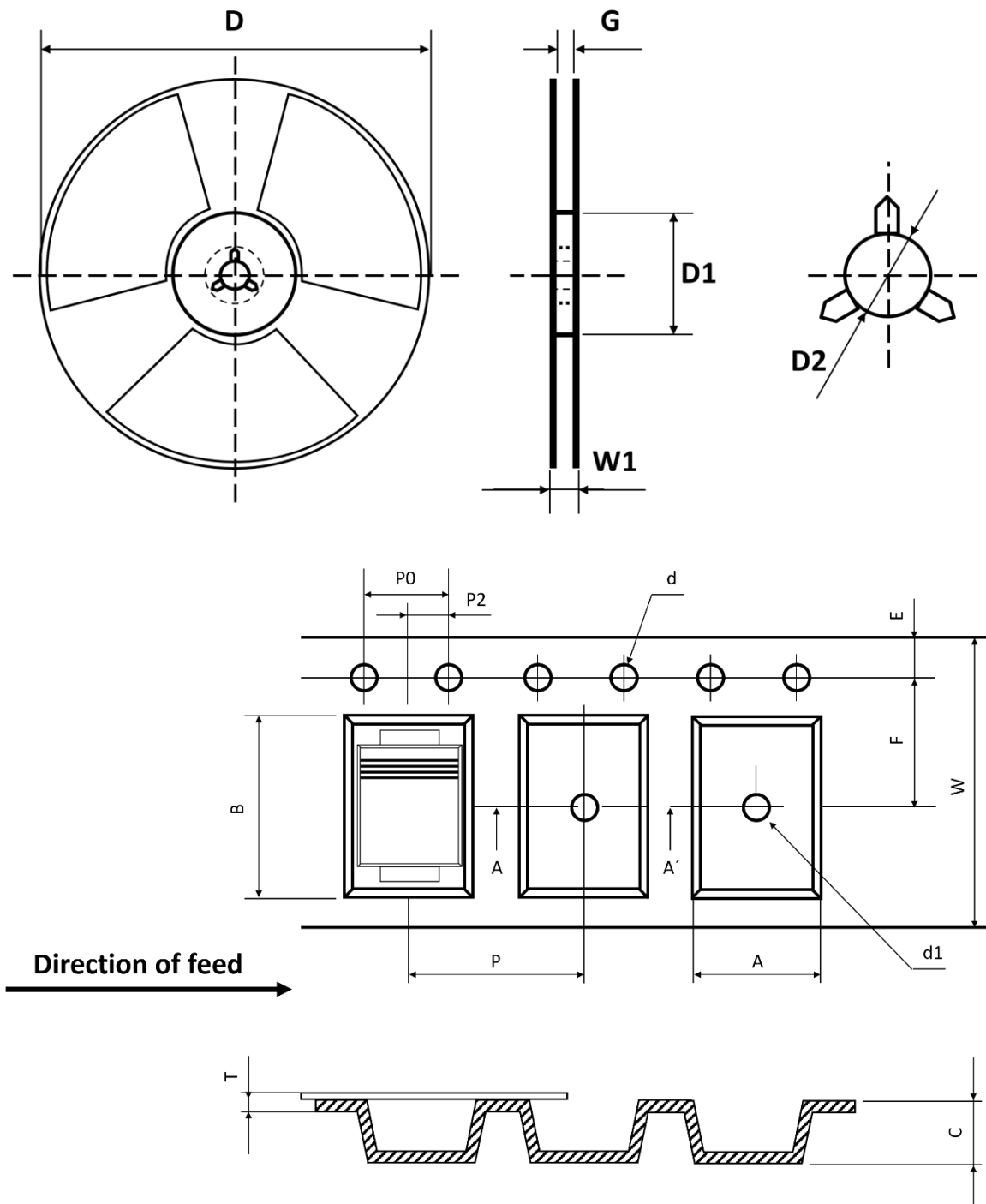
PART MARKING

Cathode Marking



Marking for
B2D04065V1
2: 2nd Generation
4: Current 4A
65: Voltage 650V

REEL AND TAPE DIMENSIONS ▲ All dimensions in mm



Package	W	A	B	C	d1	D	E	F	P	P0	T	D	D1	D2	G	W1
SMBF	12.00 ±0.30	3.90 ±0.10	5.70 ±0.10	1.40 ±0.10	1.5 Max.	1.50 ±0.10	1.75 ±0.10	5.50 ±0.10	8.00 ±0.10	4.00 ±0.10	0.20 ±0.10	330 ±0.30	50 Min.	13.00 ±0.50	12.40 Min.	18.0 Min.

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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