

1. General description

Silicon Carbide Schottky Diode in 2-lead TO247-2L plastic package, designed for high frequency switched-mode power supplies.



2. Features and benefits

- Highly stable switching performance
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant

3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

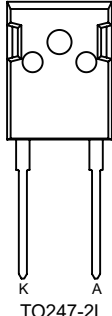
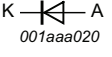
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			650			V
I_F	continuous forward current	$T_{mb} \leq 163\text{ °C}$, DC; Fig. 2		10			A
T_j	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 25\text{ °C}$; Fig. 5		-	1.45	1.70	V
		$I_F = 10\text{ A}$; $T_j = 150\text{ °C}$; Fig. 5		-	1.80	2.20	V
Dynamic characteristics							
Q_r	recovered charge	$I_F = 10\text{ A}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $V_R = 400\text{ V}$; $T_j = 25\text{ °C}$; Fig. 7		-	14.5	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">TO247-2L</p>	
2	A	anode		
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WN5C5D10650W	TO247-2L	WN5C5D10650W6Q	Tube	30	TO247L-2L(L)	10-Nov-2020
					TO247P-2L(P)	31-Mar-2023

7. Marking

Table 4. Marking codes

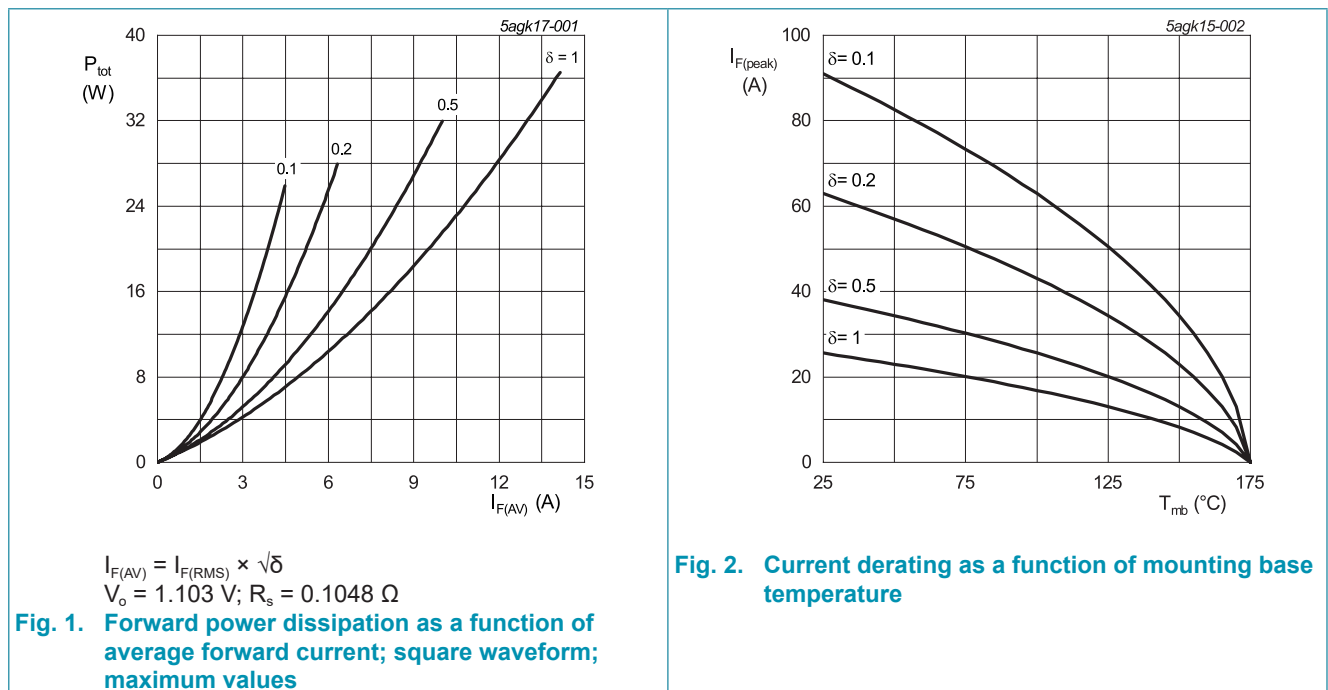
Type number	Marking codes
WN5C5D10650W	WN5C5D 10650W

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{RRM}	repetitive peak reverse voltage			650	V
V_{RWM}	crest working reverse voltage			650	V
V_R	reverse voltage	DC		650	V
I_F	continuous forward current	$T_{mb} \leq 163\text{ }^\circ\text{C}$, DC; Fig. 2		10	A
		$T_{mb} \leq 125\text{ }^\circ\text{C}$, DC; Fig. 2		13	A
		$T_{mb} \leq 25\text{ }^\circ\text{C}$, DC; Fig. 2		25	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 125\text{ }^\circ\text{C}$; square-wave pulse		20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse		60	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse		540	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$		18	A ² s
T_{stg}	storage temperature			-55 to 175	$^\circ\text{C}$
T_j	junction temperature			-55 to 175	$^\circ\text{C}$



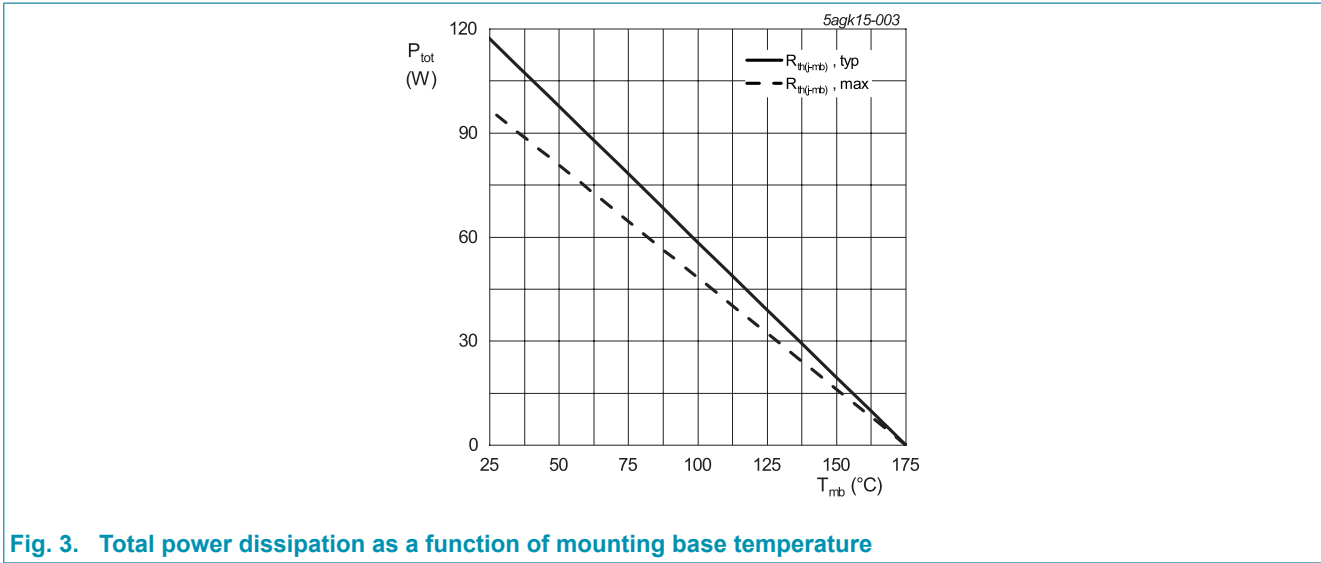


Fig. 3. Total power dissipation as a function of mounting base temperature

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 4		-	1.28	1.55	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

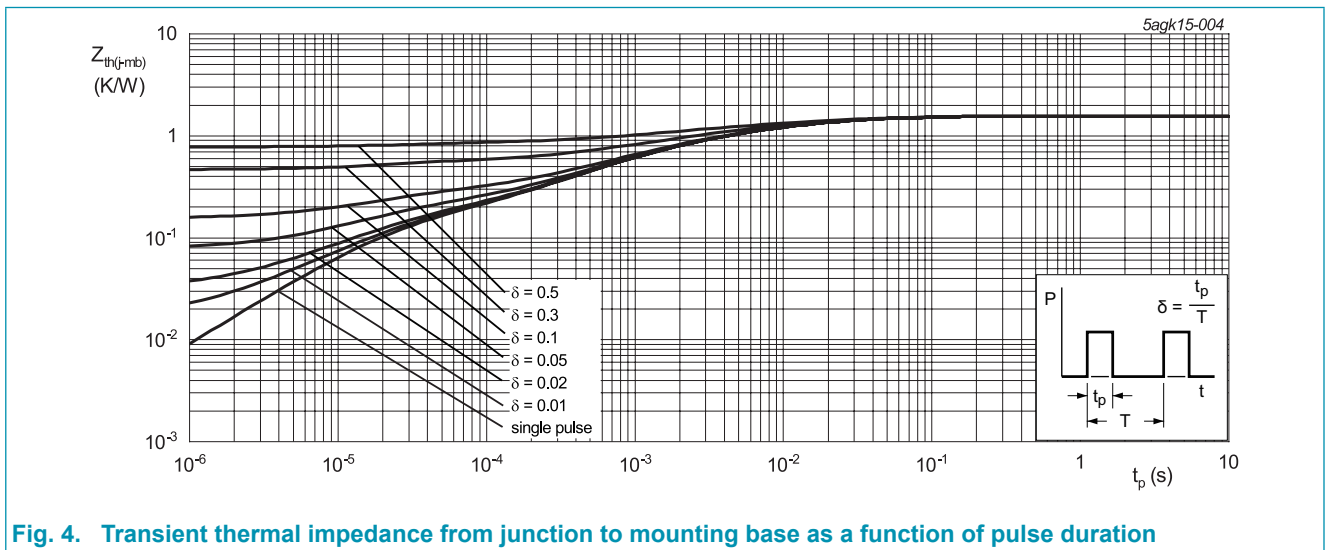
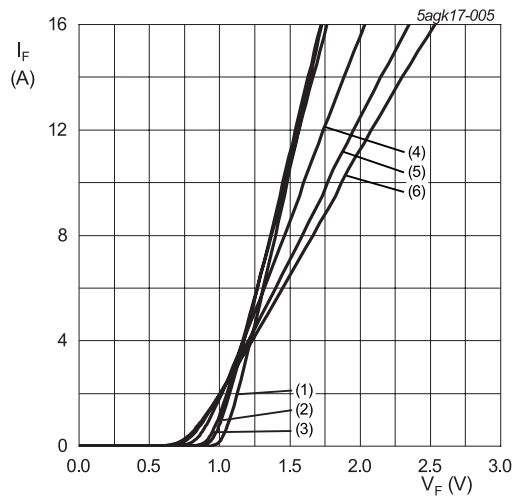


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_F	forward current	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 5}$		-	1.45	1.70	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 5}$		-	1.80	2.20	V
		$I_F = 10 \text{ A}; T_j = 175 \text{ }^\circ\text{C}; \text{Fig. 5}$		-	2.00	2.30	V
I_R	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 6}$		-	0.5	50	μA
		$V_R = 650 \text{ V}; T_j = 175 \text{ }^\circ\text{C}; \text{Fig. 6}$		-	25	250	μA
Dynamic characteristics							
Q_r	recovered charge	$I_F = 10 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 500 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$		-	14.5	-	nC
C_d	diode capacitance	$f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	323	-	pF
		$f = 1 \text{ MHz}; V_R = 300 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	38	-	pF
		$f = 1 \text{ MHz}; V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	35	-	pF
E_{as}	non-repetitive avalanche energy	$I_R = 4.9 \text{ A}; L = 5 \text{ mH}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		60	-	-	mJ



$V_o = 1.103 \text{ V}; R_s = 0.1048 \text{ } \Omega$
 (1) $T_j = -55 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 0 \text{ }^\circ\text{C}$; typical values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; typical values
 (4) $T_j = 100 \text{ }^\circ\text{C}$; typical values
 (5) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (6) $T_j = 175 \text{ }^\circ\text{C}$; typical values

Fig. 5. Forward current as a function of forward voltage; typical values

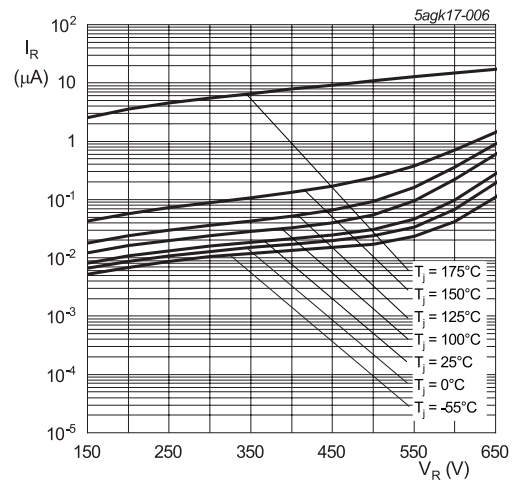


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

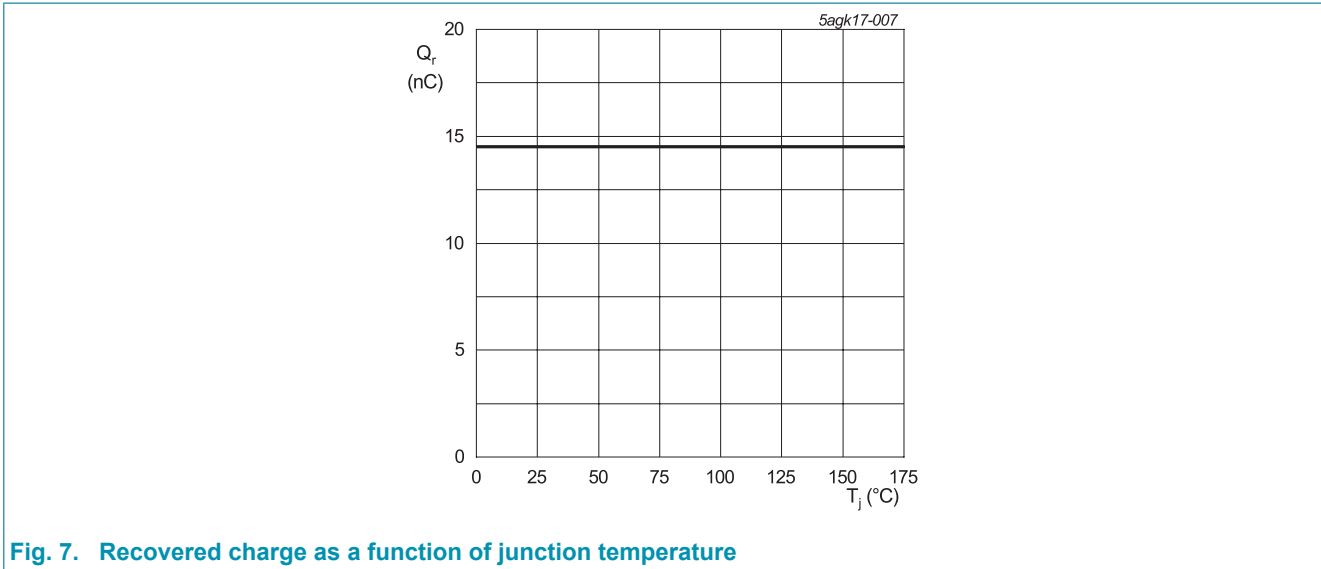
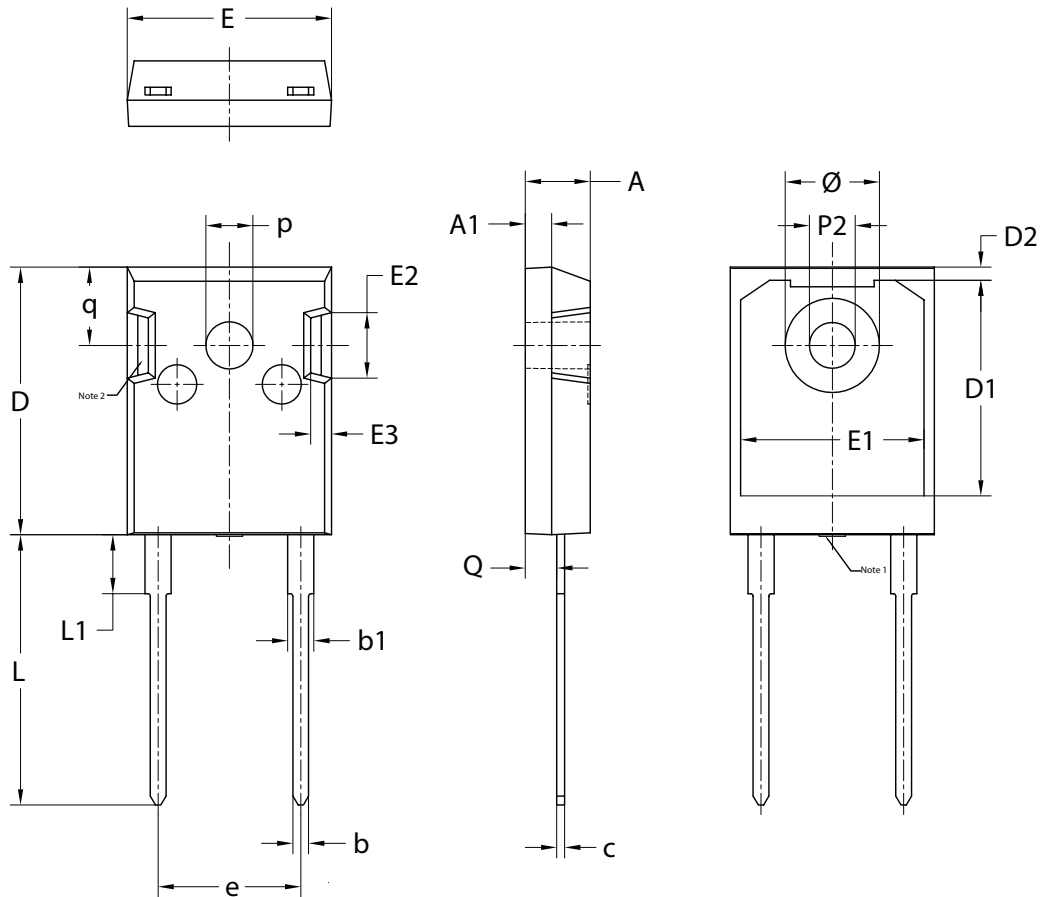


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 2 leads TO-247

TO247-2L



UNIT	A	A ₁	b	b ₁	c	D	D ₁ ②	D ₂	E	E ₁	E ₂	E ₃	e	L	L ₁	P ₂	p	Q	q	Ø
mm	5.20	2.10	1.40	2.20	0.70	20.60	16.20	1.20	15.75	14.22	5.20	1.80	10.90	20.72	4.75	3.60	3.70	2.60	6.18	7.30
	4.70	1.90	1.00	1.80	0.50	20.30	16.87	0.80	15.45	13.82	4.80	1.40	BSC	20.22	4.25	3.40	3.50	2.20	5.78	7.10

- Note:
1. Mold resin protrusion max 0.127mm.
 2. Metal exposed with Sn plating.

12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 13 March 2024
