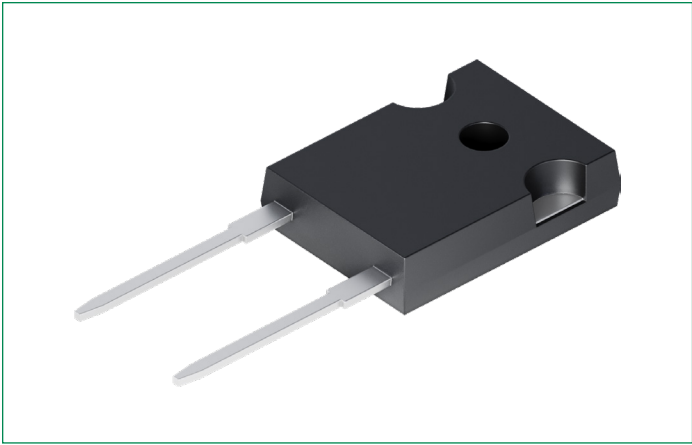


DCK20I650HA

650 V, 20 A SiC Schottky Diode

RoHS

HF



Features

- Max junction temperature of 175 °C
- High surge current capacity
- Extremely short reverse recovery time
- High-frequency operation
- Temperature independent switching behavior
- Positive temperature coefficient on V_F

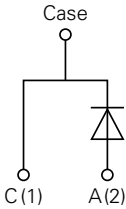
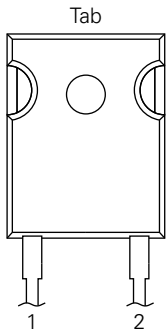
Applications

- PV microinverter
- Power adapter
- TV power
- Power factor correction
- Switch mode power supply

Product Summary

Characteristic	Value	Unit
V_{RRM}	650	V
$I_F (T_c = 144\text{ °C})$	20	A
Q_c	47.9	nC

Pinout Diagram TO-247-2L



1: Cathode; **2:** Anode; **Tab:** Case

Maximum Ratings ($T_c = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristic	Conditions	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	–	650	V
V_{DC}	DC blocking voltage	–	650	V
I_F	Continuous forward current	–	$T_c = 25\text{ }^{\circ}\text{C}$	A
			$T_c = 135\text{ }^{\circ}\text{C}$	
			$T_c = 144\text{ }^{\circ}\text{C}$	
I_{FSM}	Non-repetitive surge forward current	Sine halfwave @ $T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$	120	A
I_{FRM}	Repetitive peak forward current	Frequency = 0.1 Hz, 100 cycles sine halfwave @ $T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$	100	A
P_{tot}	Total power dissipation	–	$T_c = 25\text{ }^{\circ}\text{C}$	W
			$T_c = 150\text{ }^{\circ}\text{C}$	
I^2t	I^2t	$T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$	72	A ² s
T_{vj}	Virtual operating junction temperature range	–	–55 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	–	–55 to 175	$^{\circ}\text{C}$
M	Mounting torque	M3 screw	0.7	Nm

Note: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Thermal Characteristics

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance, junction to case Fig.7	–	0.85	–	K/W

Electrical Characteristics ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristic	Conditions		Value			Unit
				Min.	Typ.	Max.	
V _F	Forward voltage Fig.1	I _F = 20 A	T _{vj} = 25 °C	–	1.45	1.65	V
			T _{vj} = 175 °C	–	1.85	2.5	
I _R	Reverse current Fig.2	V _R = 650 V	T _{vj} = 25 °C	–	5	100	μA
			T _{vj} = 175 °C	–	30	500	
C	Total capacitance Fig.3	V _R = 1 V, f = 1 MHz		–	716	–	pF
		V _R = 200 V, f = 1 MHz		–	90.8	–	
		V _R = 400 V, f = 1 MHz		–	79.5	–	
Q _c	Total capacitive charge Fig.4	V _R = 400 V, T _{vj} = 25 °C, Q _c = ∫ ₀ ^{V_R} C(V)dV		–	47.9	–	nC
E _c	Capacitance stored energy Fig.5	V _R = 400 V, T _{vj} = 25 °C, E _c = ∫ ₀ ^{V_R} C(V) · VdV		–	7.21	–	μJ

Characteristic Curves

Fig. 1. Typical Forward Characteristics

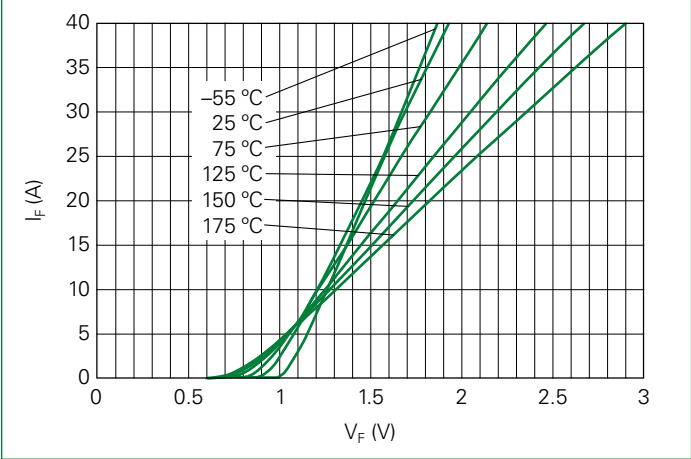


Fig. 2. Typical Reverse Characteristics

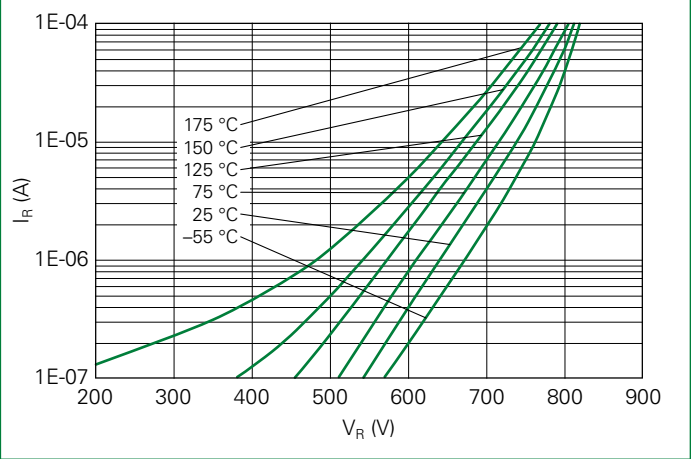


Fig. 3. Capacitance vs. Reverse Voltage

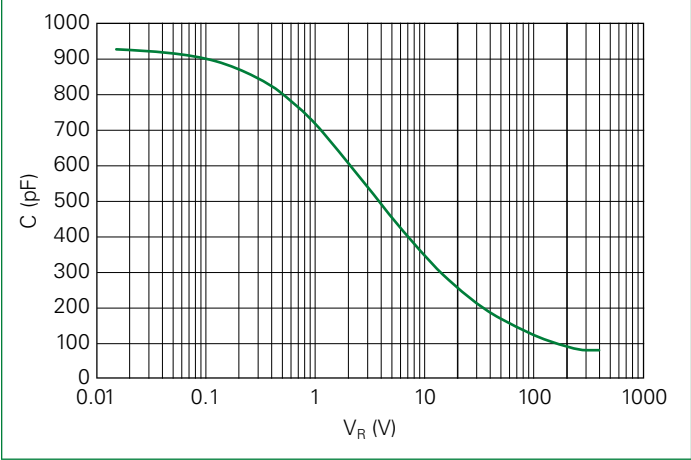


Fig. 4. Total Capacitive Charge vs. Reverse Voltage

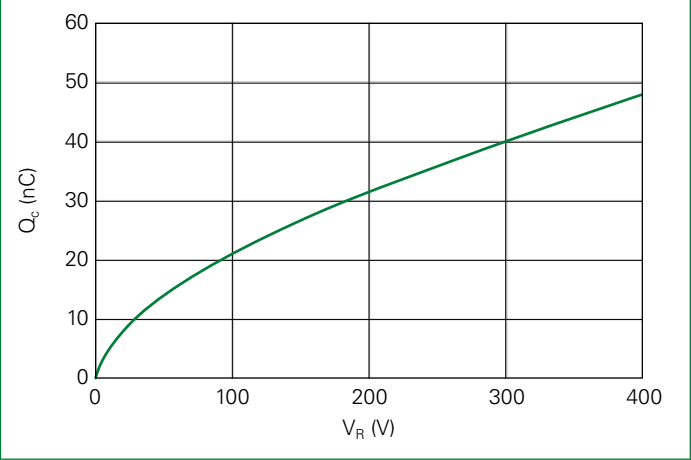


Fig. 5. Capacitance Stored Energy

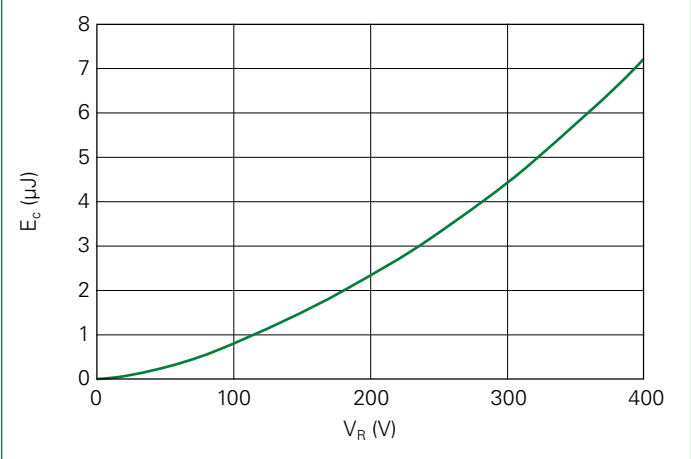


Fig. 6. Power Derating

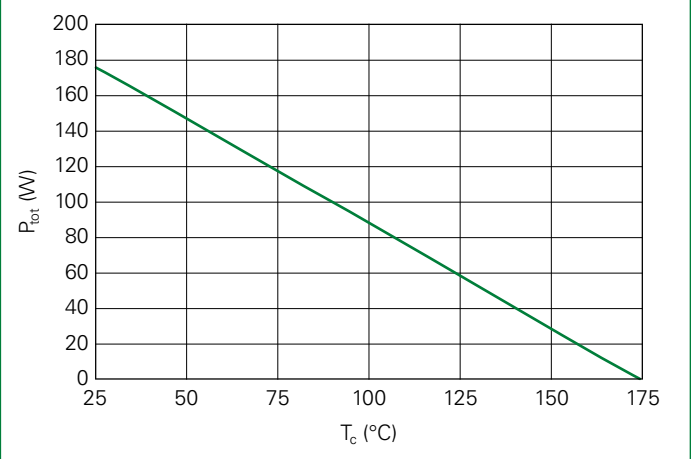
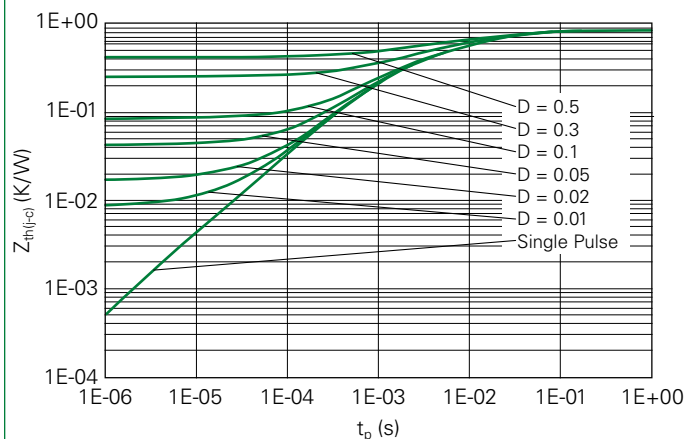
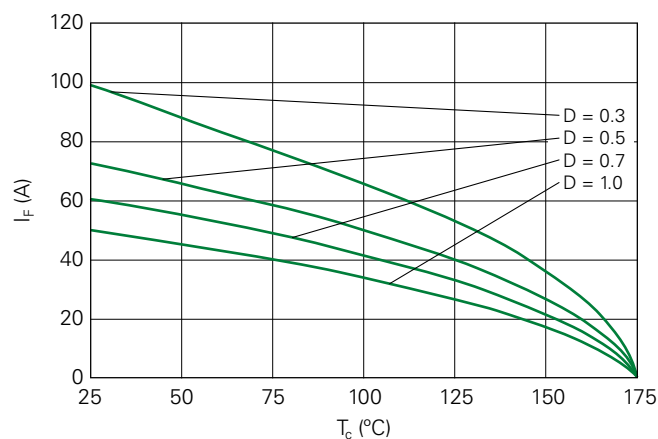
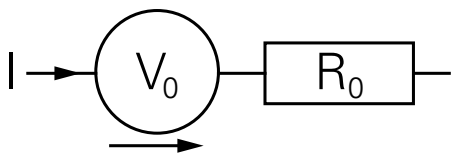


Fig. 7. Transient Thermal Impedance**Fig. 8. Forward Current vs. Case Temperature**

Diode V_F Model for Simulation



$$V_F(T_j) = V_0 + I R_0$$

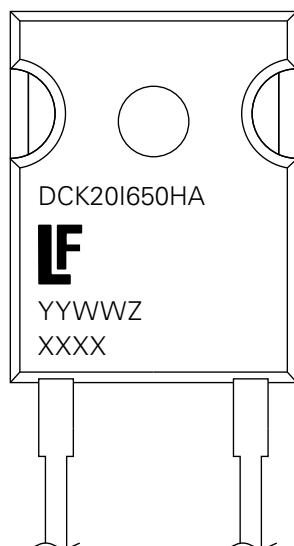
$$V_0 = 1 \times 10^{-7} \cdot T_j^2 - 0.0013 \cdot T_j + 0.9966$$

$$R_0 = 6 \times 10^{-7} \cdot T_j^2 + 7 \times 10^{-5} \cdot T_j + 0.0223$$

Notes

- T_j is the junction temperature in °C
- Range valid from 25 °C to 175 °C
- Model represents performance of a typical chart

Part Number and Marking



DCK20I650HA = Part Material Number

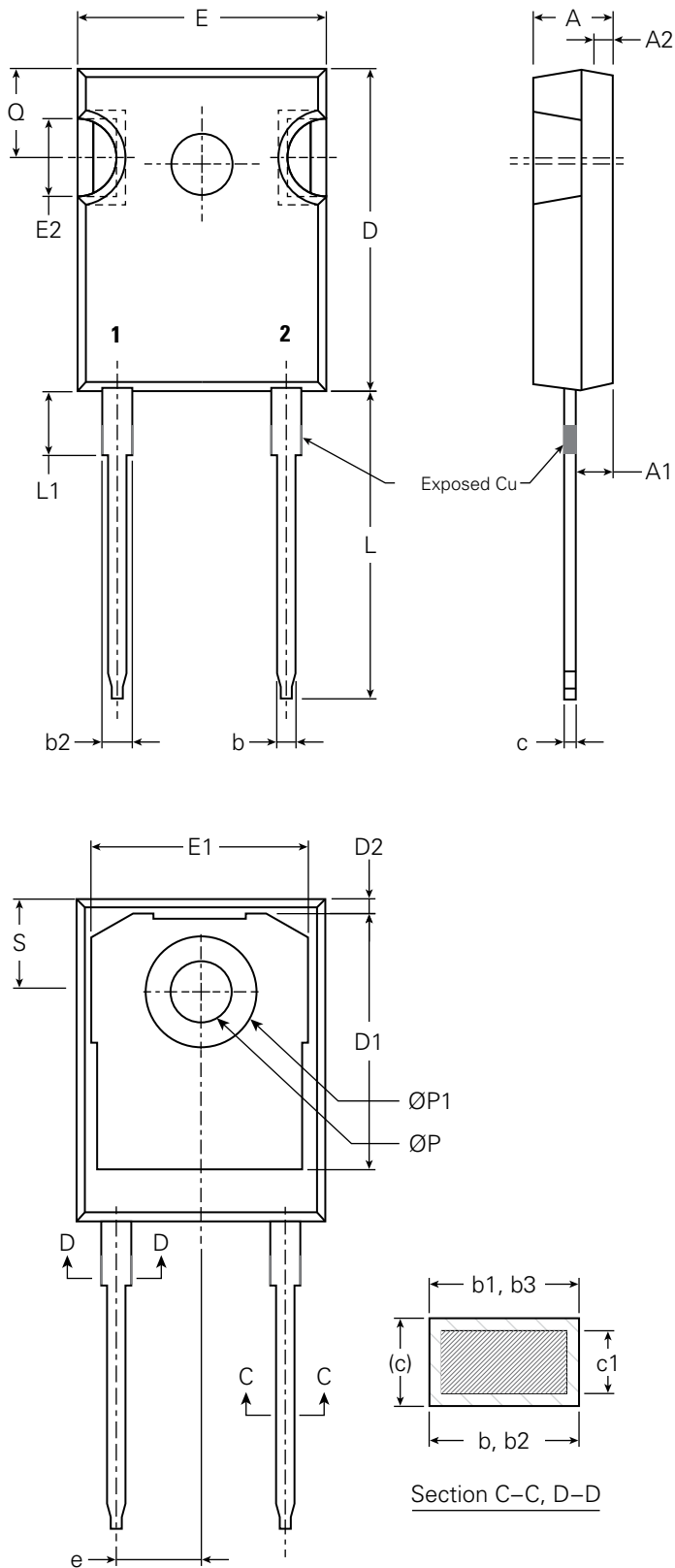
YY = Year

WW = Work Week

Z = Assembly Location

XXXX = Lot Traceability

Part Outline Drawing TO-247-2L



Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.190	—	0.205	4.83	—	5.21
A1	0.087	—	0.102	2.20	—	2.60
A2	0.059	—	0.098	1.50	—	2.49
b	0.039	—	0.055	1.00	—	1.40
b1	0.039	—	0.053	0.99	—	1.35
b2	0.071	—	0.095	1.80	—	2.41
b3	0.065	—	0.094	1.65	—	2.39
c	0.020	—	0.028	0.50	—	0.70
c1	0.015	—	0.028	0.38	—	0.70
D	0.799	—	0.831	20.30	—	21.10
D1	0.515	—	—	13.08	—	—
D2	0.020	—	0.053	0.51	—	1.35
E	0.608	—	0.635	15.45	—	16.13
E1	0.516	—	—	13.10	—	—
E2	0.145	—	0.216	3.68	—	5.49
e	0.214 BSC			5.44 BSC		
L	0.780	—	0.827	19.80	—	21.00
L1	—	—	0.177	—	—	4.50
ØP	0.138	—	0.146	3.50	—	3.70
ØP1	—	—	0.291	—	—	7.40
Q	0.212	—	0.244	5.39	—	6.20
S	0.238	—	0.248	6.04	—	6.30

Note:

1. Package Reference: JEDEC TO247, Variation AD
2. Slot required, notch may be rounded or rectangular
3. Dimension D&E do not include mold flash
4. Subject to change without notice

Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.

Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.



Part of:

