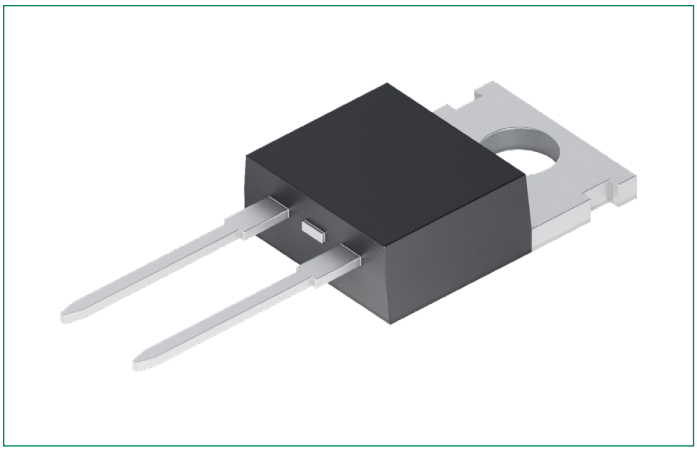
DCK10I650PA

650 V, 14.4 A SiC Schottky Diode

RoHS HF



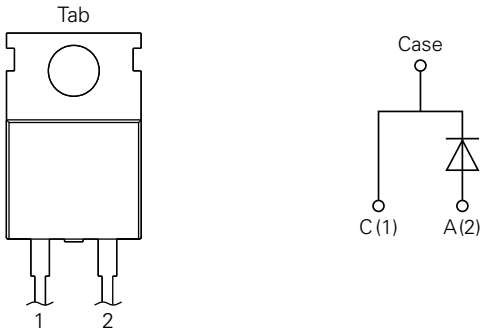
Features

- 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
- Power factor correction
- Switch mode power supply

Pinout Diagram TO-220-2L



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

Product Summary

Characteristic	Value	Unit
V_{RRM}	650	V
I_F (T_c = 135 °C)	14.4	A
Q_c	25.5	nC

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Maximum Ratings (T_c = 25 °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 °C	29.3	A
			T_c = 135 °C	14.4	
			T_c = 151 °C	10	
I_{FSM}	Non-repetitive surge forward current	Sine halfwave @ T_c = 25 °C, t_p = 10 ms		60	A
I_{FRM}	Repetitive peak forward current	Frequency = 0.1 Hz, 100 cycles sine halfwave @ T_c = 25 °C, t_p = 10 ms		48	A
P_{tot}	Total power dissipation	–	T_c = 25 °C	107.1	W
			T_c = 150 °C	17.8	
I^2t	I^2t	T_c = 25 °C, t_p = 10 ms		18	A^2s
T_{vj}	Virtual operating junction temperature range	–		–55 to 175	°C
T_{stg}	Storage temperature range	–		–55 to 175	°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]	–	1.4	–	K/W

Electrical Characteristics (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions		Value			Unit
				Min.	Typ.	Max.	
V_F	Forward voltage [Fig.1]	I_F = 10 A	T_{vj} = 25 °C	–	1.37	1.55	V
			T_{vj} = 175 °C	–	1.70	2.00	
I_R	Reverse current [Fig.2]	V_R = 650 V	T_{vj} = 25 °C	–	1	10	µA
			T_{vj} = 175 °C	–	10	100	
C	Total capacitance [Fig.3]	V_R = 1 V, f = 1 MHz		–	398	–	pF
		V_R = 200 V, f = 1 MHz		–	47.6	–	
		V_R = 400 V, f = 1 MHz		–	41.9	–	
Q_c	Total capacitive charge [Fig.4]	V_R = 400 V, T_{vj} = 25 °C, $Q_c = \int_0^{VR} C(V)dV$		–	25.5	–	nC
E_c	Capacitance stored energy [Fig.5]	V_R = 400 V, T_{vj} = 25 °C, $E_c = \int_0^{VR} C(V) \cdot VdV$		–	3.80	–	µJ

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Characteristic Curves

Fig. 1. Typical Forward Characteristics

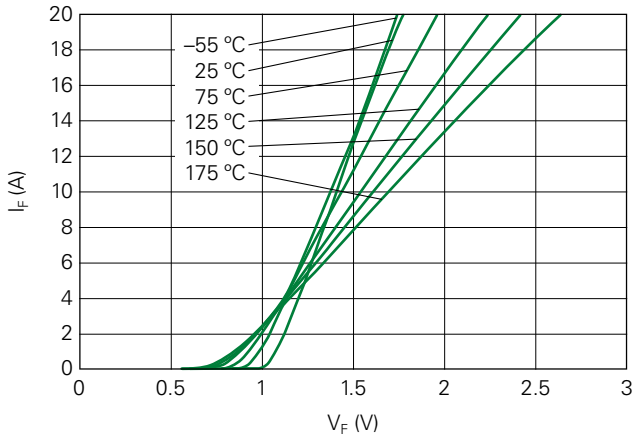

Fig. 2. Typical Reverse Characteristics

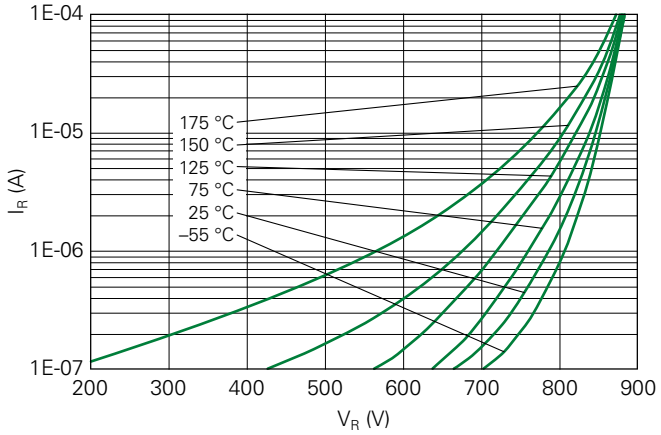

Fig. 3. Capacitance vs. Reverse Voltage

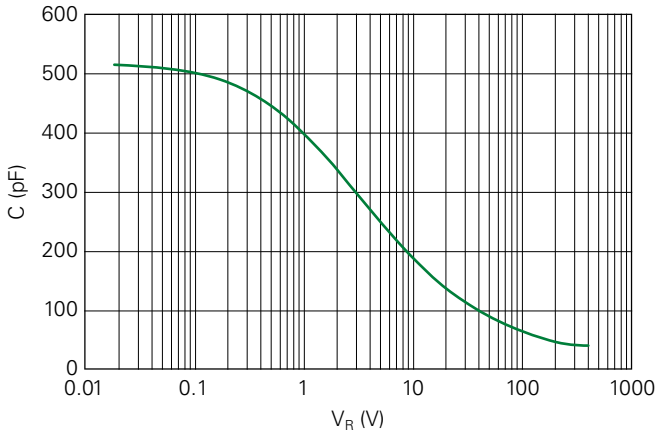

Fig. 4. Total Capacitive Charge vs. Reverse Voltage

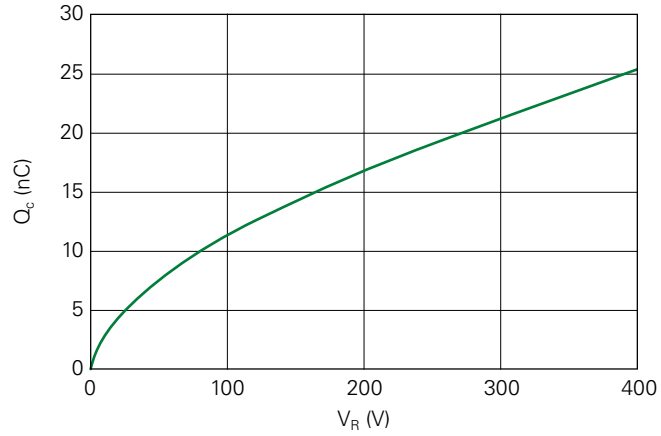

Fig. 5. Capacitance Stored Energy

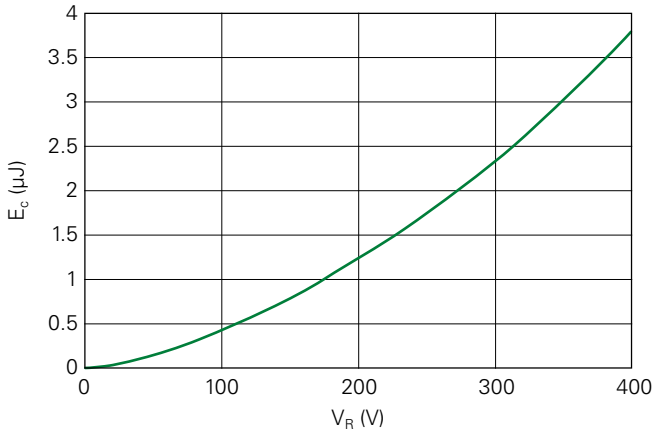

Fig. 6. Power Derating

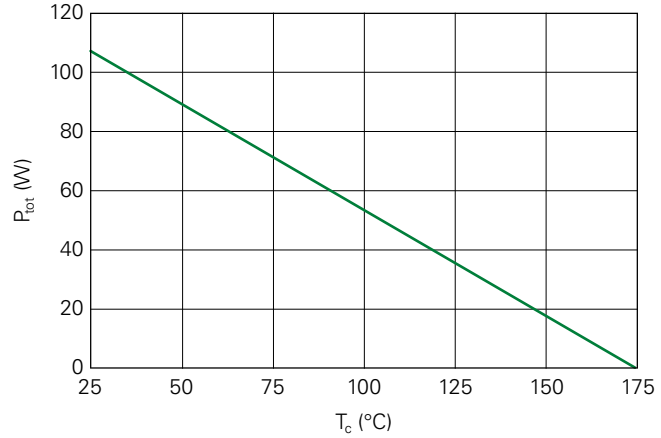

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Fig. 7. Transient Thermal Impedance

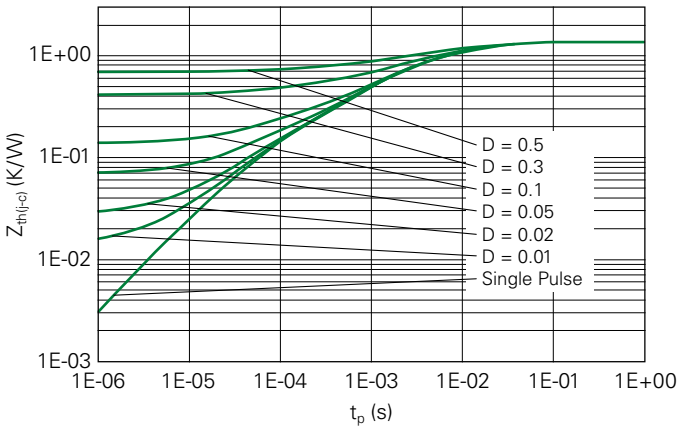
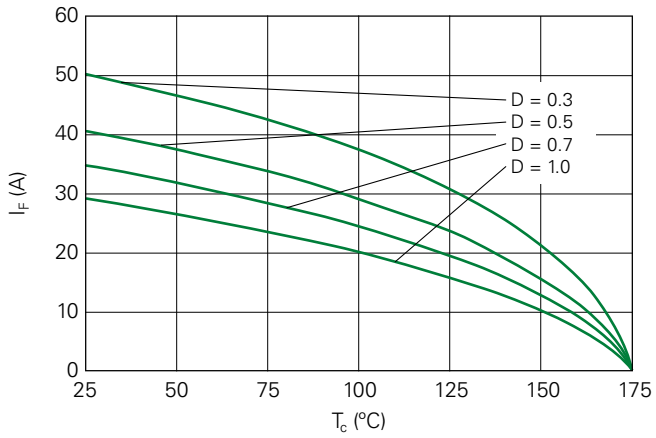
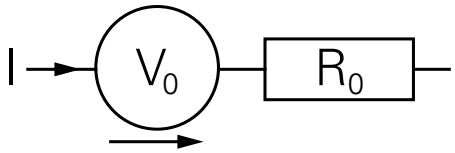


Fig. 8. Forward Current vs. Case Temperature



Diode V_F Model for Simulation



$V_F(T_j) = V_0 + IR_0$

$V_0 = -1 \times 10^{-6} \cdot T_j^2 - 0.0014 \cdot T_j + 0.9415$

$R_0 = 1 \times 10^{-6} \cdot T_j^2 - 0.0001 \cdot T_j + 0.0384$

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

DCK10I650PA = Part Material Number
YY = Year
WW = Work Week
Z = Assembly Location
XXXX = Lot Traceability

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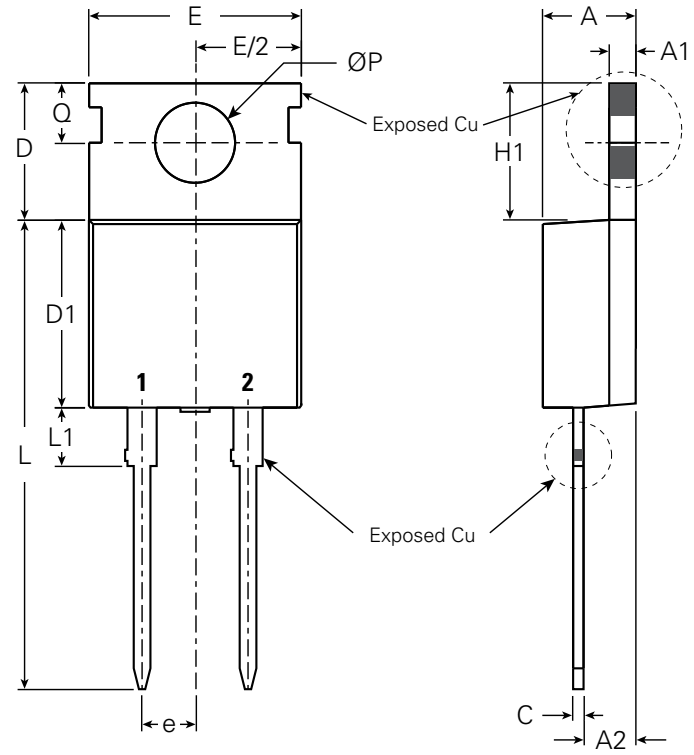
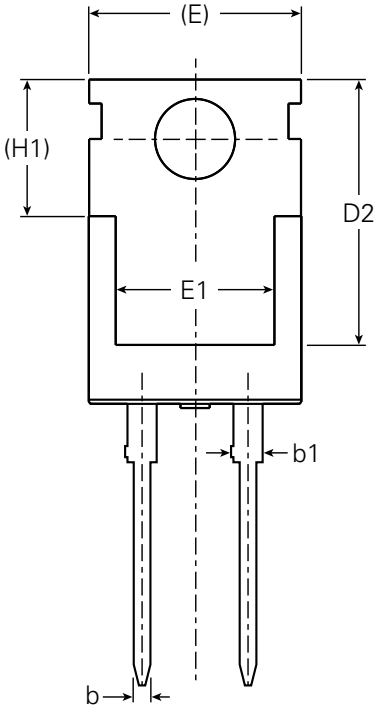
Part Outline Drawing TO-220-2L





Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.167	–	0.183	4.24	–	4.64
A1	0.046	–	0.055	1.16	–	1.40
A2	0.089	–	0.106	2.25	–	2.70
b	0.028	–	0.036	0.70	–	0.91
b1	0.046	–	0.069	1.17	–	1.75
C	0.013	–	0.026	0.33	–	0.65
D	0.579	–	0.630	14.70	–	16.00
D1	0.347	–	0.372	8.82	–	9.45
D2	0.497	–	0.533	12.63	–	13.55
E	0.390	–	0.408	9.91	–	10.36
E1	0.270	–	0.350	6.86	–	8.89
e	0.100 BSC			2.54 BSC		
H1	0.248	–	0.262	6.30	–	6.65
L	0.508	–	0.550	12.90	–	13.97
L1	0.112	–	0.157	2.85	–	4.00
ØP	0.134	–	0.155	3.40	–	3.93
Q	0.102	–	0.118	2.60	–	3.00

Note:
1. Package Reference: JEDEC TO220, Variation AB
2. Slot required, notch may be rounded or rectangular
3. Dimension D&E do not include mold flash
4. Subject to change without notice

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