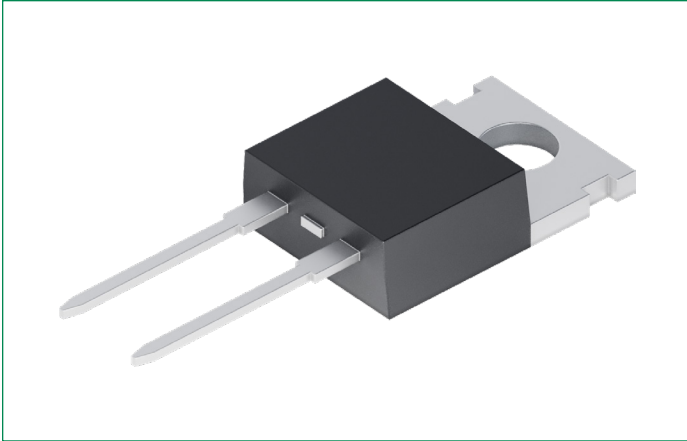


**DCK10I650PA**

650 V, 14.4 A SiC Schottky Diode

RoHS

HF

**Features**

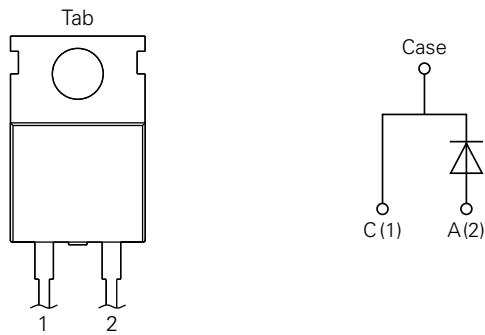
- Max junction temperature of 175 °C
- High surge current capacity
- Extremely short reverse recovery time
- High-frequency operation
- Temperature independent switching behavior
- Positive temperature coefficient on  $V_F$

**Applications**

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

**Product Summary**

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

**Pinout Diagram** TO-220-2L**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	–	$T_c = 25\text{ }^\circ\text{C}$	29.3	A
			$T_c = 135\text{ }^\circ\text{C}$	14.4	
			$T_c = 151\text{ }^\circ\text{C}$	10	
$I_{FSM}$	Non-repetitive surge forward current	Sine halfwave @ $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	60	A	
$I_{FRM}$	Repetitive peak forward current	Frequency = 0.1 Hz, 100 cycles sine halfwave @ $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	48	A	
$P_{tot}$	Total power dissipation	–	$T_c = 25\text{ }^\circ\text{C}$	107.1	W
			$T_c = 150\text{ }^\circ\text{C}$	17.8	
$I^2t$	$I^2t$	$T_c = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	18	A <sup>2</sup> 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.

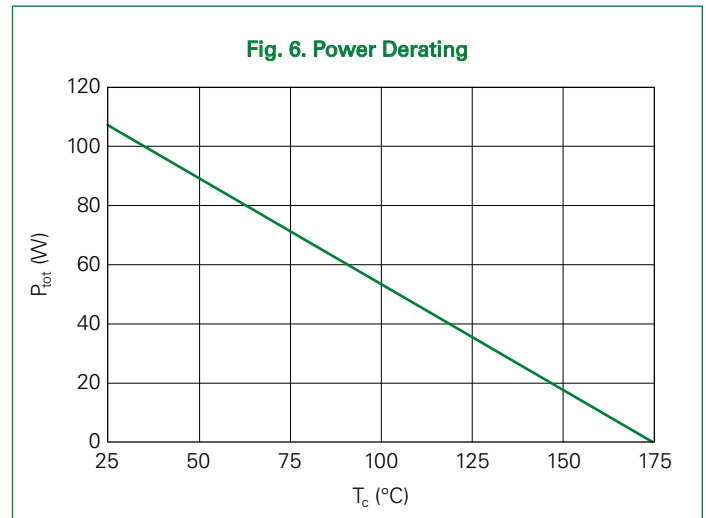
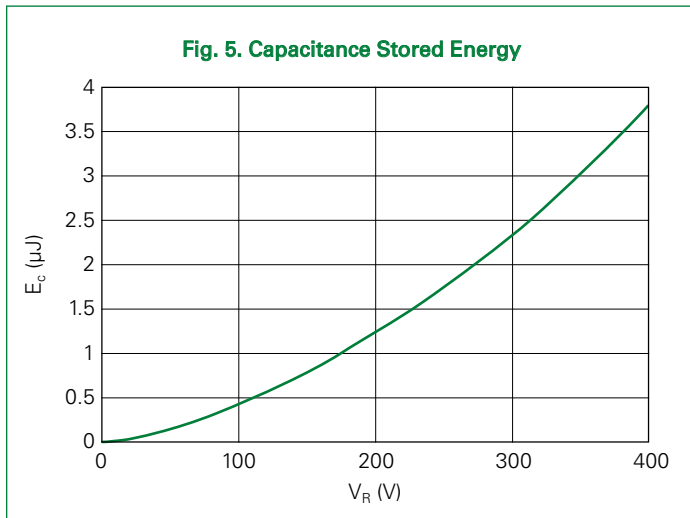
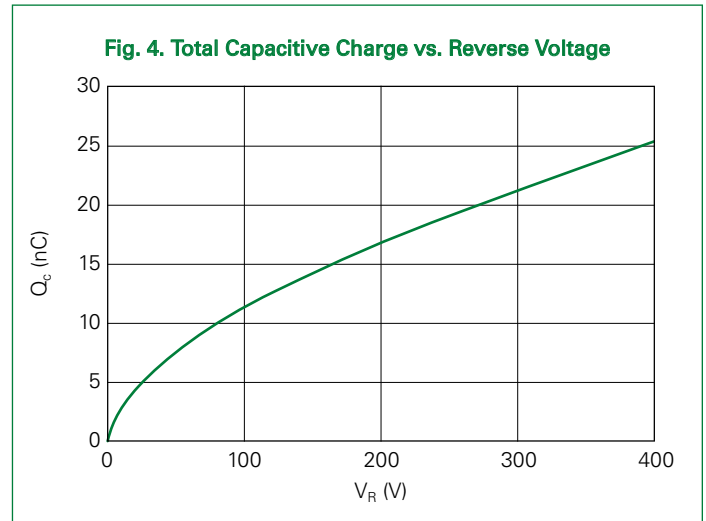
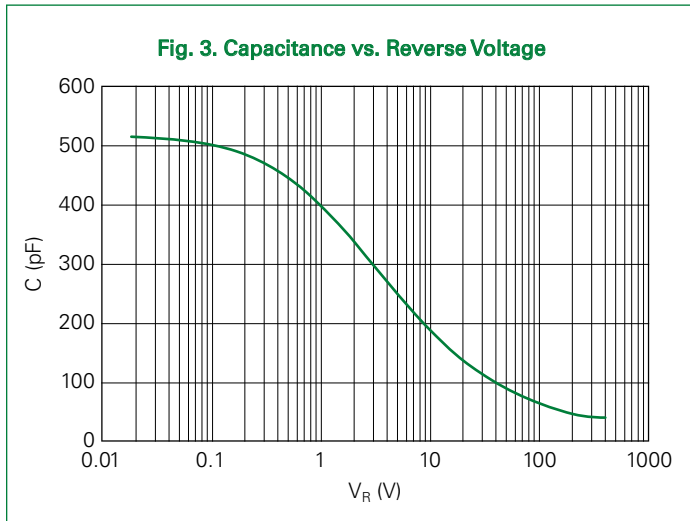
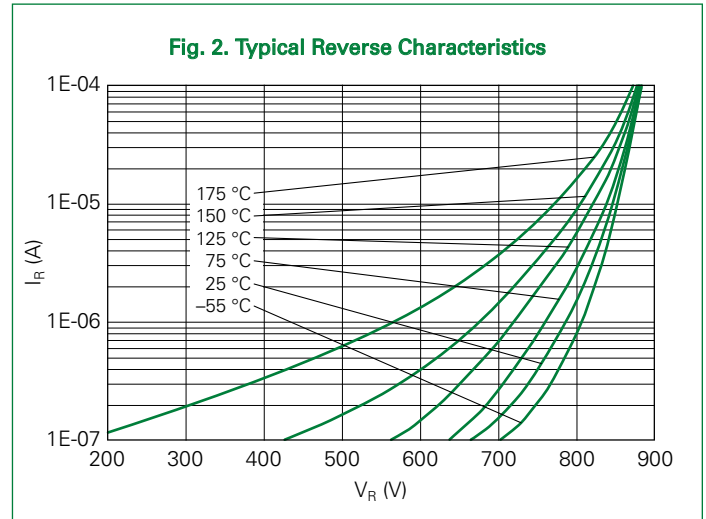
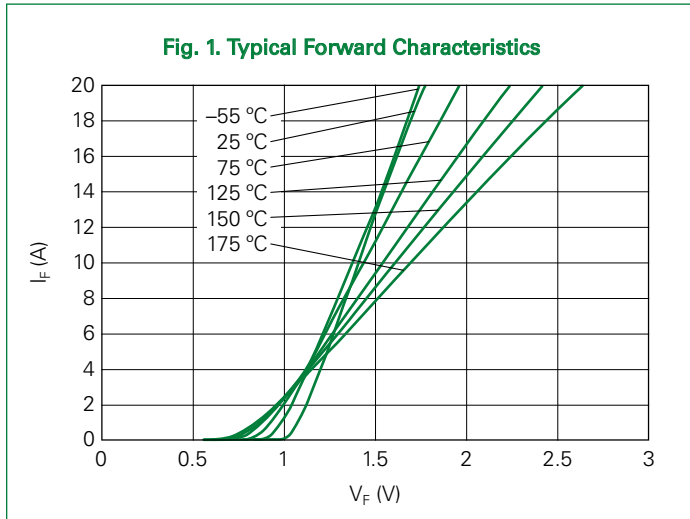
**Thermal Characteristics**

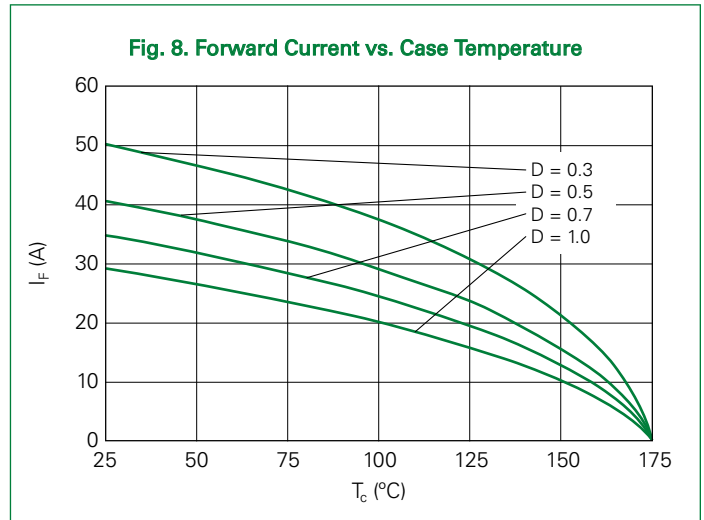
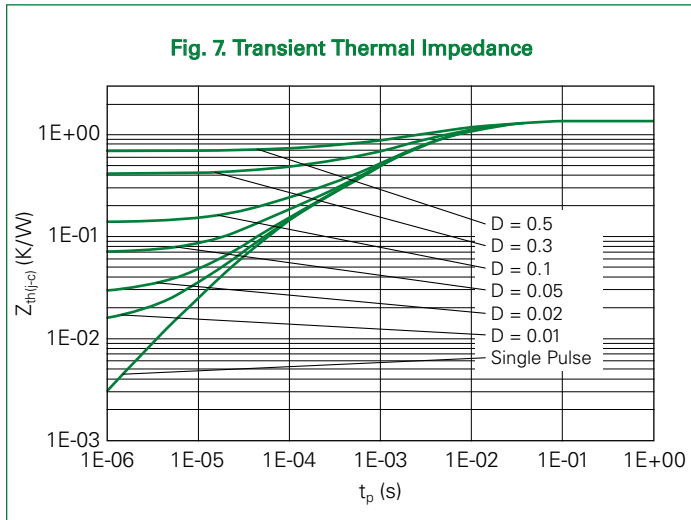
Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance, junction to case <sup>Fig.7</sup>	–	1.4	–	K/W

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

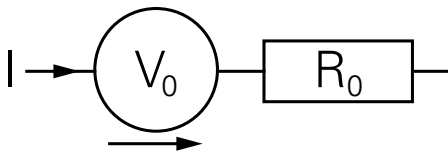
Symbol	Characteristic	Conditions	Value			Unit	
			Min.	Typ.	Max.		
$V_F$	Forward voltage <sup>Fig.1</sup>	$I_F = 10\text{ A}$	$T_{vj} = 25\text{ }^\circ\text{C}$	–	1.37	1.55	V
			$T_{vj} = 175\text{ }^\circ\text{C}$	–	1.70	2.00	
$I_R$	Reverse current <sup>Fig.2</sup>	$V_R = 650\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	–	1	10	$\mu\text{A}$
			$T_{vj} = 175\text{ }^\circ\text{C}$	–	10	100	
C	Total capacitance <sup>Fig.3</sup>	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$	–	398	–	$\text{pF}$	
		$V_R = 200\text{ V}$ , $f = 1\text{ MHz}$	–	476	–		
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$	–	41.9	–		
$Q_c$	Total capacitive charge <sup>Fig.4</sup>	$V_R = 400\text{ V}$ , $T_{vj} = 25\text{ }^\circ\text{C}$ , $Q_c = \int_0^{VR} C(V)dV$	–	25.5	–	nC	
$E_c$	Capacitance stored energy <sup>Fig.5</sup>	$V_R = 400\text{ V}$ , $T_{vj} = 25\text{ }^\circ\text{C}$ , $E_c = \int_0^{VR} C(V) \cdot VdV$	–	3.80	–	$\mu\text{J}$	

**Characteristic Curves**





**Diode V<sub>F</sub> 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<sub>j</sub> 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

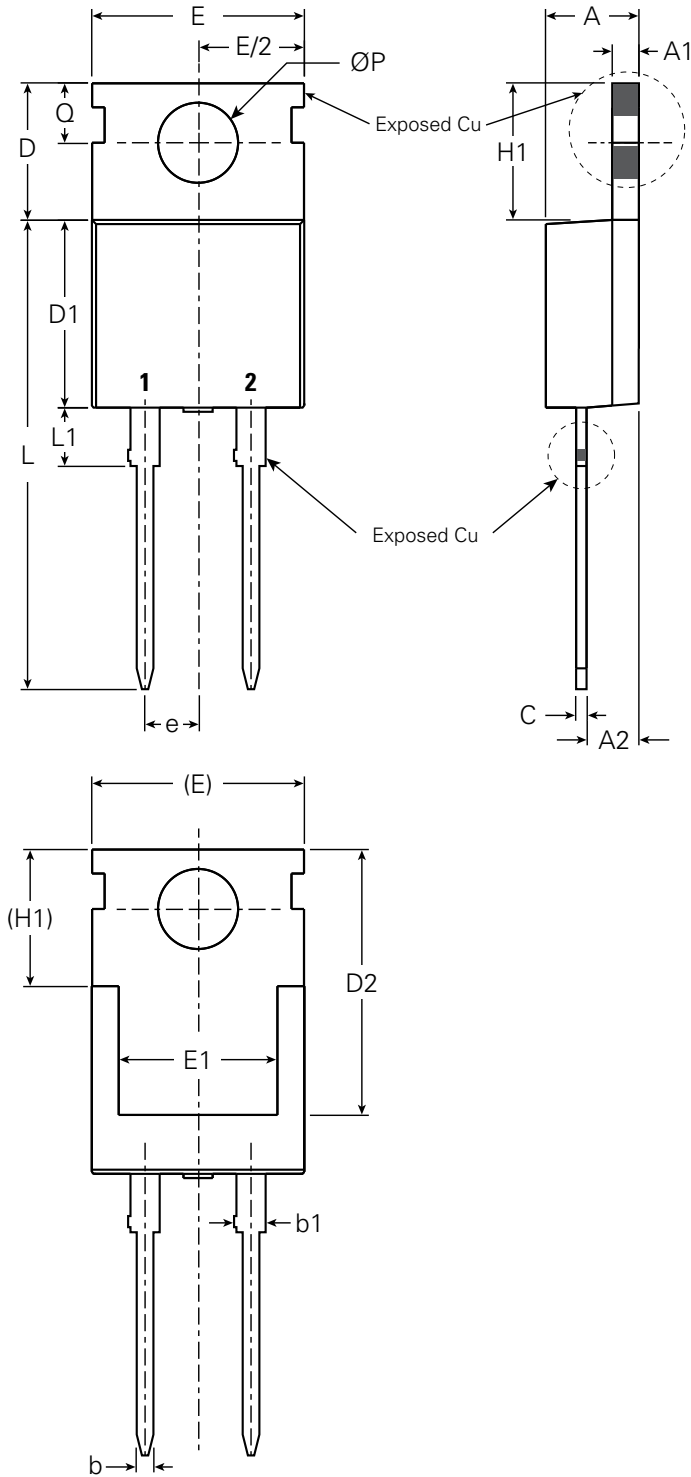
YY = Year

WW = Work Week

Z = Assembly Location

XXXX = Lot Traceability

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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Part of:

