Table of Content

1 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	–	–	20	A	$T_C \leq 135\ °C$, $D = 1$
		–	–	22		$T_C \leq 125\ °C$, $D = 1$
		–	–	41		$T_C \leq 25\ °C$, $D = 1$
Surge-repetitive forward current, sine halfwave[1]	$I_{F,RM}$	–	–	87		$T_C = 25\ °C$, $t_p = 10$ ms
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	99		$T_C = 25\ °C$, $t_p = 10$ ms
		–	–	79		$T_C = 150\ °C$, $t_p = 10$ ms
Non-repetitive peak forward current	$I_{F,max}$	–	–	780		$T_C = 25\ °C$, $t_p = 10$ µs
i²t value	$\int i^2 dt$	–	–	49	A²s	$T_C = 25\ °C$, $t_p = 10$ ms
		–	–	31		$T_C = 150\ °C$, $t_p = 10$ ms
Repetitive peak reverse voltage	V_{RRM}	–	–	650	V	$T_C = 25\ °C$
Diode dv/dt ruggedness	dv/dt	–	–	150	V/ns	$V_R = 0..480$ V
Power dissipation	P_{tot}	–	–	108	W	$T_C = 25°C$, $R_{thJC,max}$
Operating and storage temperature	T_j T_{stg}	-55	–	175	°C	–
Mounting torque	–	–	–	70	Ncm	M3 screw

2 Thermal characteristics

Table 4 Thermal characteristics (PG-TO-220-2)

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	R_{thJC}	–	0.8	1.3	K/W	–
Thermal resistance, junction-ambient	R_{thJA}	–	–	62		leaded
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	–	–	260	°C	1.6 mm (0.063 in.) from case for 10 s

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[1] The surge-repetitive forward current test was performed with 1000 pulses (half-wave rectified sine with the 10 ms period).

3 Electrical characteristics

3.1 Static characteristics

Table 5   Static characteristics

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	650	–	–	V	T_j = 25 °C
Diode forward voltage	V_F	–	1.25	1.35		I_F = 20 A, T_j = 25 °C
		–	1.5	–		I_F = 20 A, T_j = 150 °C
Reverse current	I_R	–	2.0	67	µA	V_R = 420 V, T_j = 25 °C
		–	66	–		V_R = 420 V, T_j = 125 °C
		–	153	–		V_R = 420 V, T_j = 150 °C

3.2 AC characteristics

Table 6   AC characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	–	26.8	–	nC	V_R = 400 V, T_j = 150 °C, di/dt = 200 A/µs, $I_F \leq I_{F,MAX}$
Total capacitance	C	–	970	–	pF	V_R = 1 V, f = 1 MHz, T_j = 25 °C
		–	57	–		V_R = 300 V, f = 1 MHz, T_j = 25 °C
		–	55	–		V_R = 600 V, f = 1 MHz, T_j = 25 °C

4 Diagrams

$P_{tot} = f(T_C)$
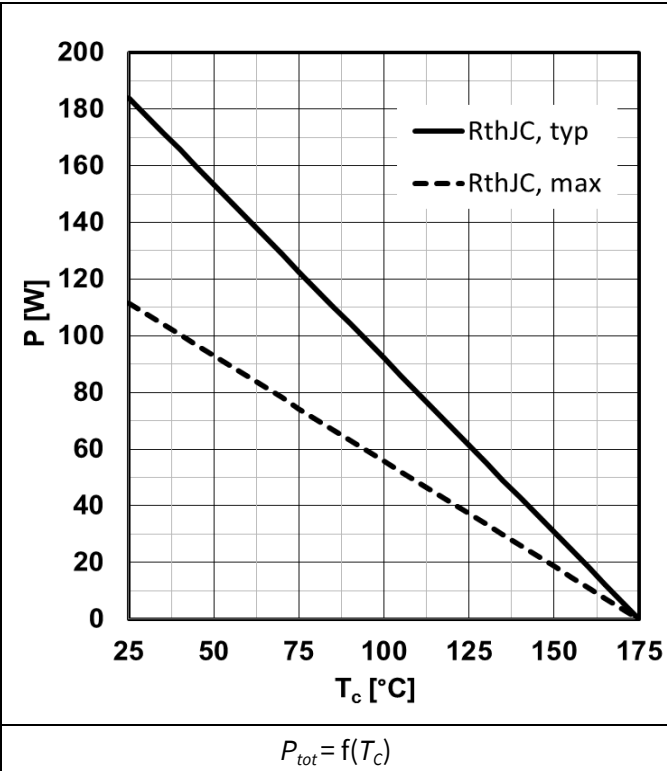
Figure 1 Power dissipation

$I_F = f(T_C)$; $R_{thJC,max}$; $T_j \leq 175\,°C$; parameter: $D = t_P/T$
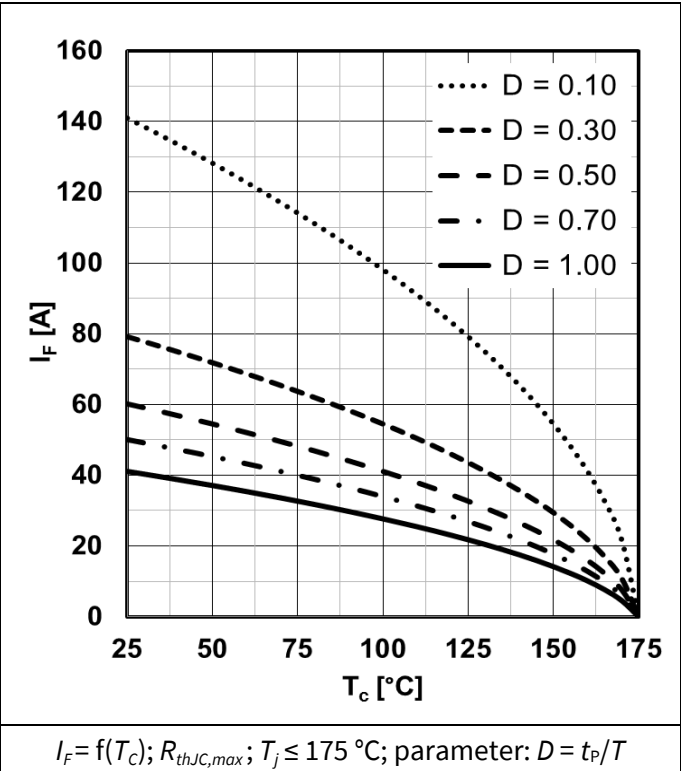
Figure 2 Max. forward current

$I_F = f(V_F)$; $t_p = 10\,µs$; parameter: T_j
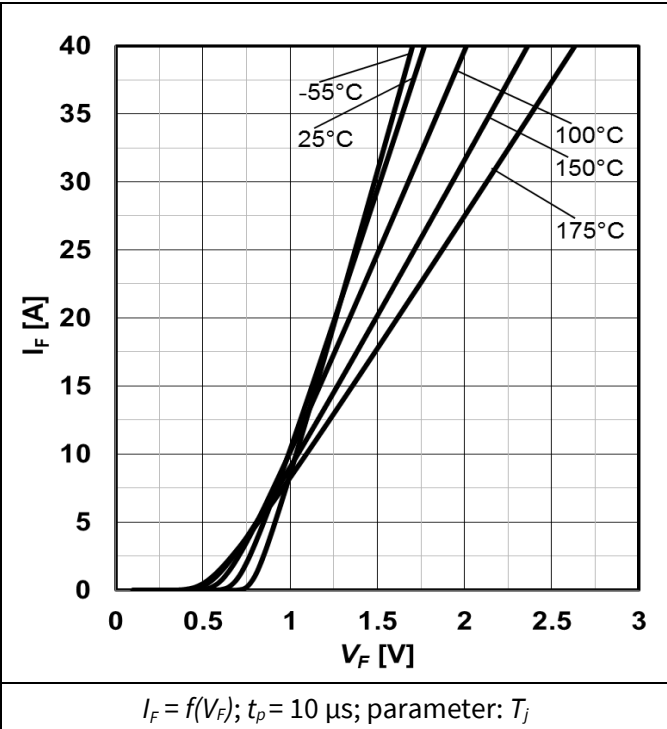
Figure 3 Typ. forward characteristics

$I_F = f(V_F)$; $t_p = 10\,µs$; parameter: T_j
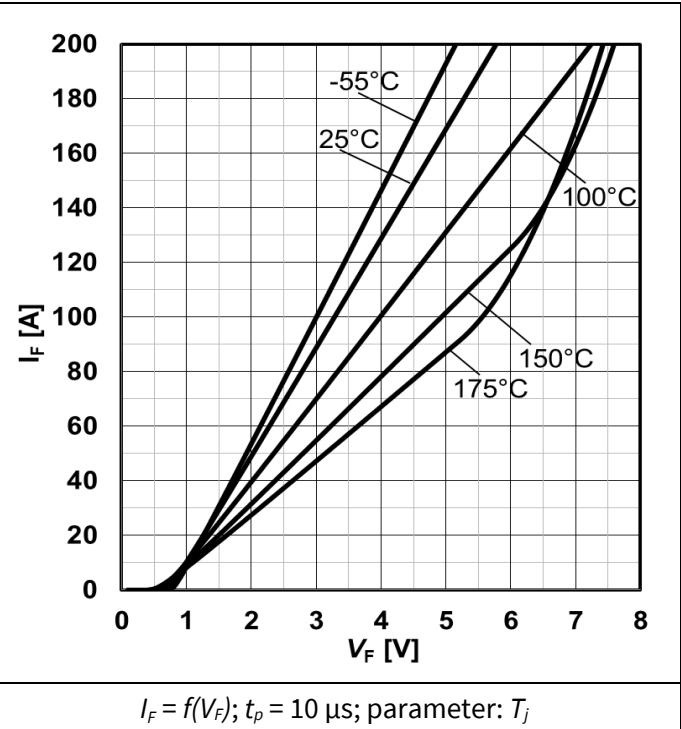
Figure 4 Typ. forward characteristics in surge current

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$Q_C = f(di_F/dt)$; $T_j = 150\,°C$; $V_R = 400\,V$; $I_F \leq I_{F,max}$
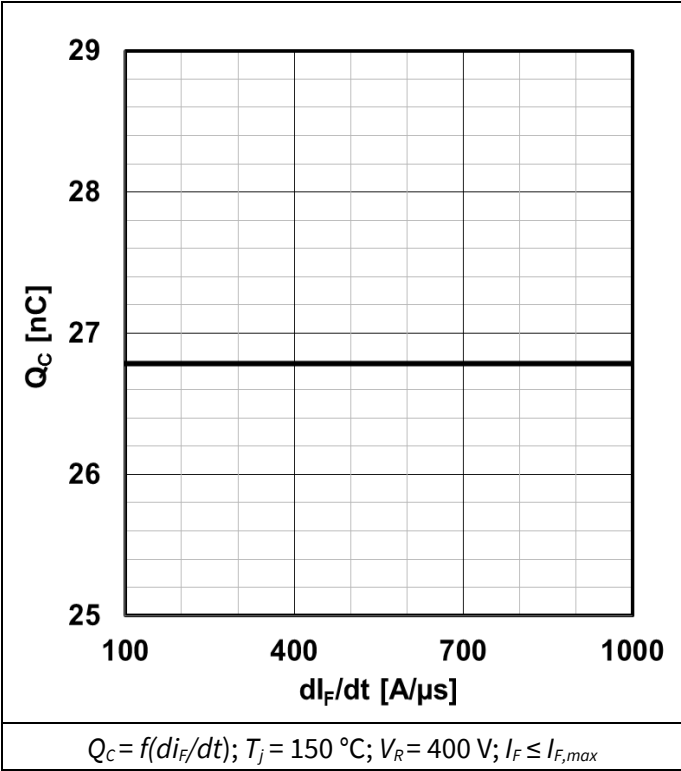
Figure 5   Typ. cap. charge vs. current slope

$I_R = f(V_R)$; parameter: T_j
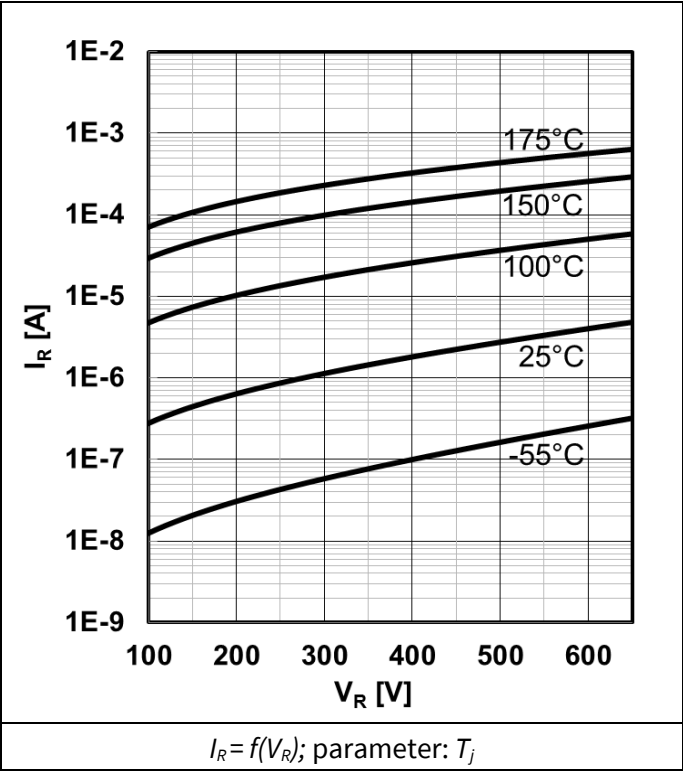
Figure 6   Typ. reverse current vs. reverse voltage

$Z_{th,jc} = f(t_P)$; parameter: $D = t_P/T$
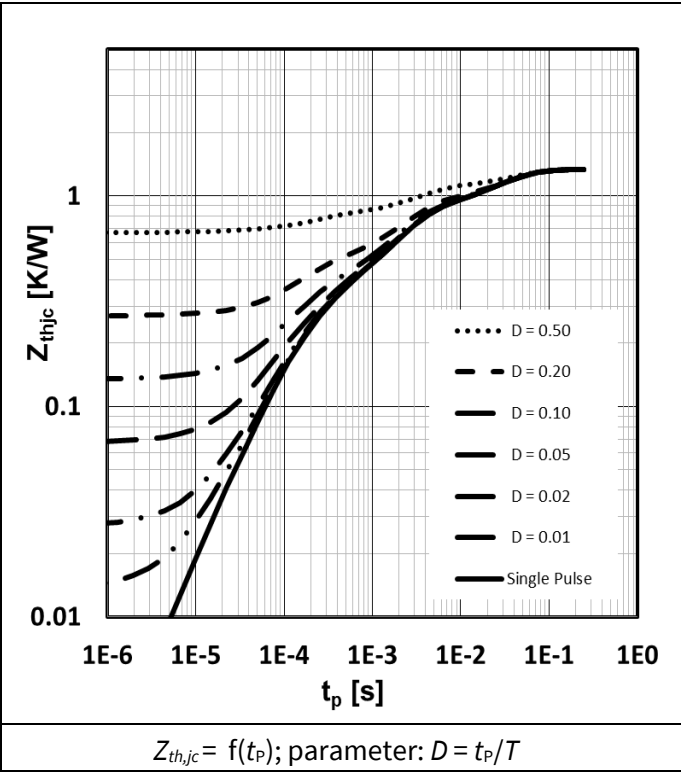
Figure 7   Max. transient thermal
impedance

$C = f(V_R)$; $T_j = 25\,°C$; $f = 1\,MHz$
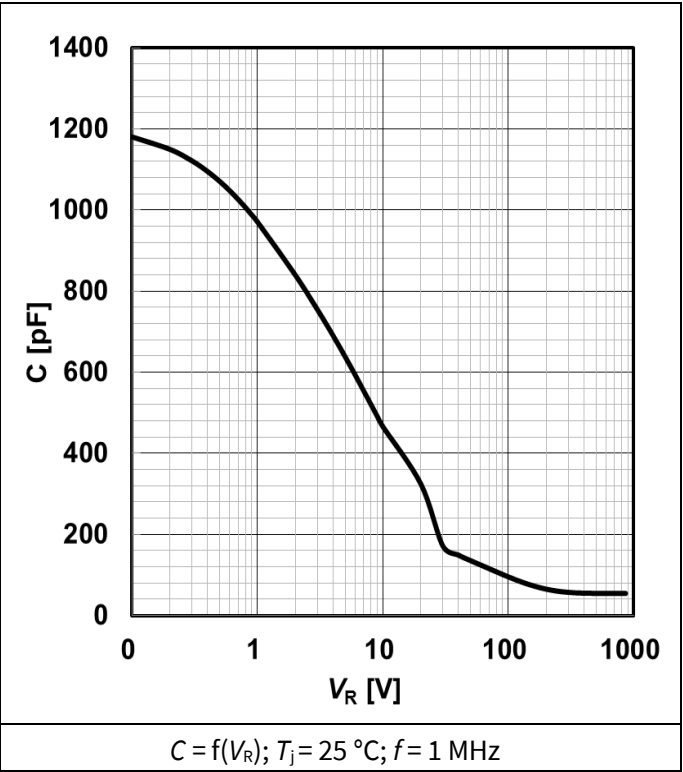
Figure 8   Typ. capacitance vs. reverse voltage

$E_C = f(V_R)$
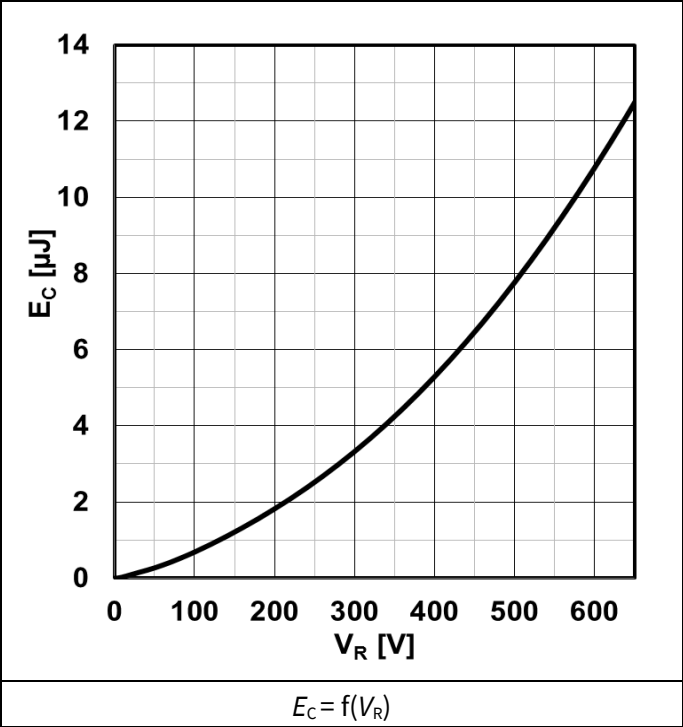
Figure 9   Typ. capacitance stored energy

5   Simplified forward characteristic

$V_F = f(I_F)$
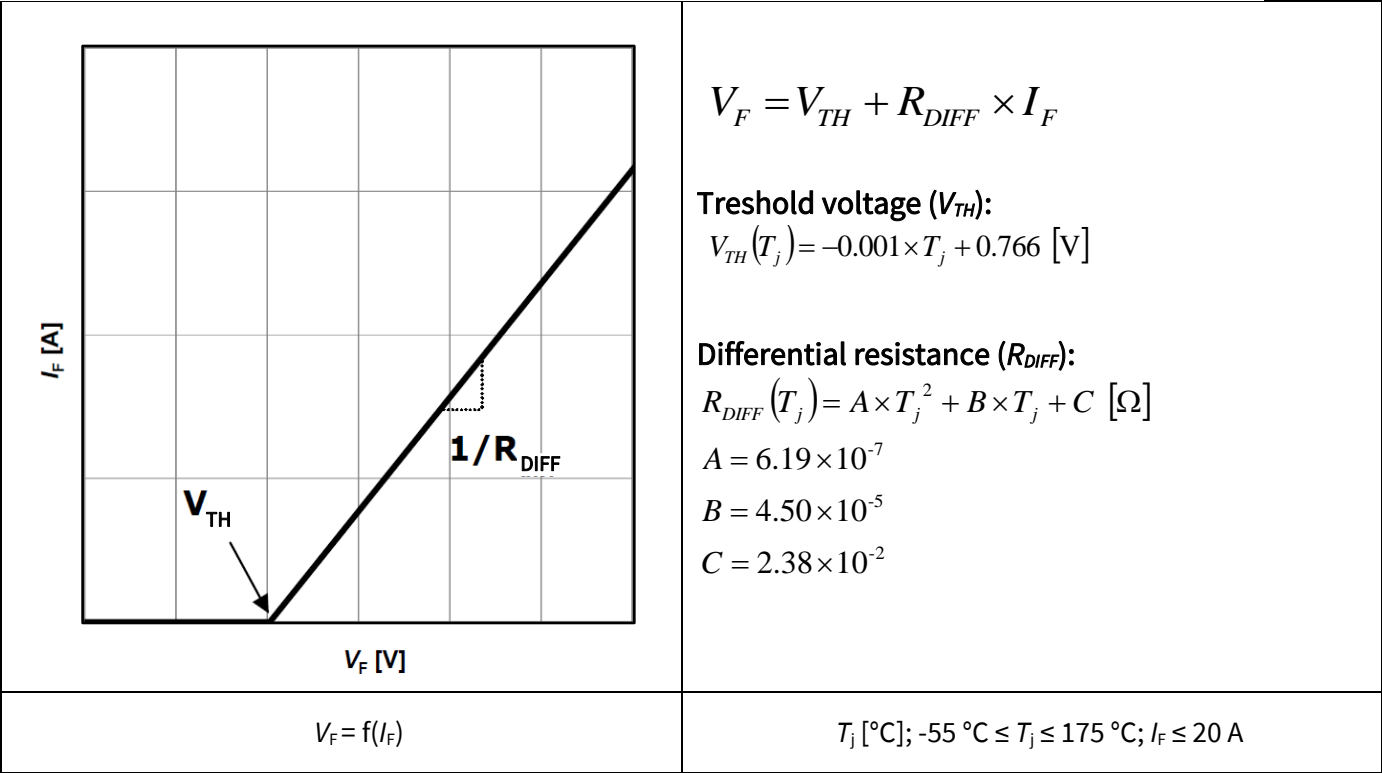
Figure 10   Equivalent forward current curve

$$V_F = V_{TH} + R_{DIFF} \times I_F$$

Treshold voltage (V_{TH}):
$$V_{TH}(T_j) = -0.001 \times T_j + 0.766 \; [\text{V}]$$

Differential resistance (R_{DIFF}):
$$R_{DIFF}(T_j) = A \times T_j^2 + B \times T_j + C \; [\Omega]$$
$$A = 6.19 \times 10^{-7}$$
$$B = 4.50 \times 10^{-5}$$
$$C = 2.38 \times 10^{-2}$$

T_j [°C]; -55 °C ≤ T_j ≤ 175 °C; I_F ≤ 20 A

Figure 11   Mathematical Equation

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6 Package outlines

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.50	0.169	0.177
A1	1.17	1.37	0.046	0.054
A2	2.30	2.50	0.091	0.098
b	0.65	0.85	0.026	0.033
b1	1.19	1.69	0.047	0.066
b2	1.19	1.39	0.047	0.055
c	0.40	0.60	0.016	0.024
D	15.35	15.95	0.604	0.628
D1	9.05	9.45	0.356	0.372
D2	12.30	13.05	0.484	0.514
E	9.80	10.20	0.386	0.402
E1	7.25	8.60	0.285	0.339
e1	5.08		0.200	
N	2		2	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	3.30	3.70	0.130	0.146
øP	3.55	3.70	0.140	0.146
Q	2.60	3.00	0.102	0.118

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SCALE

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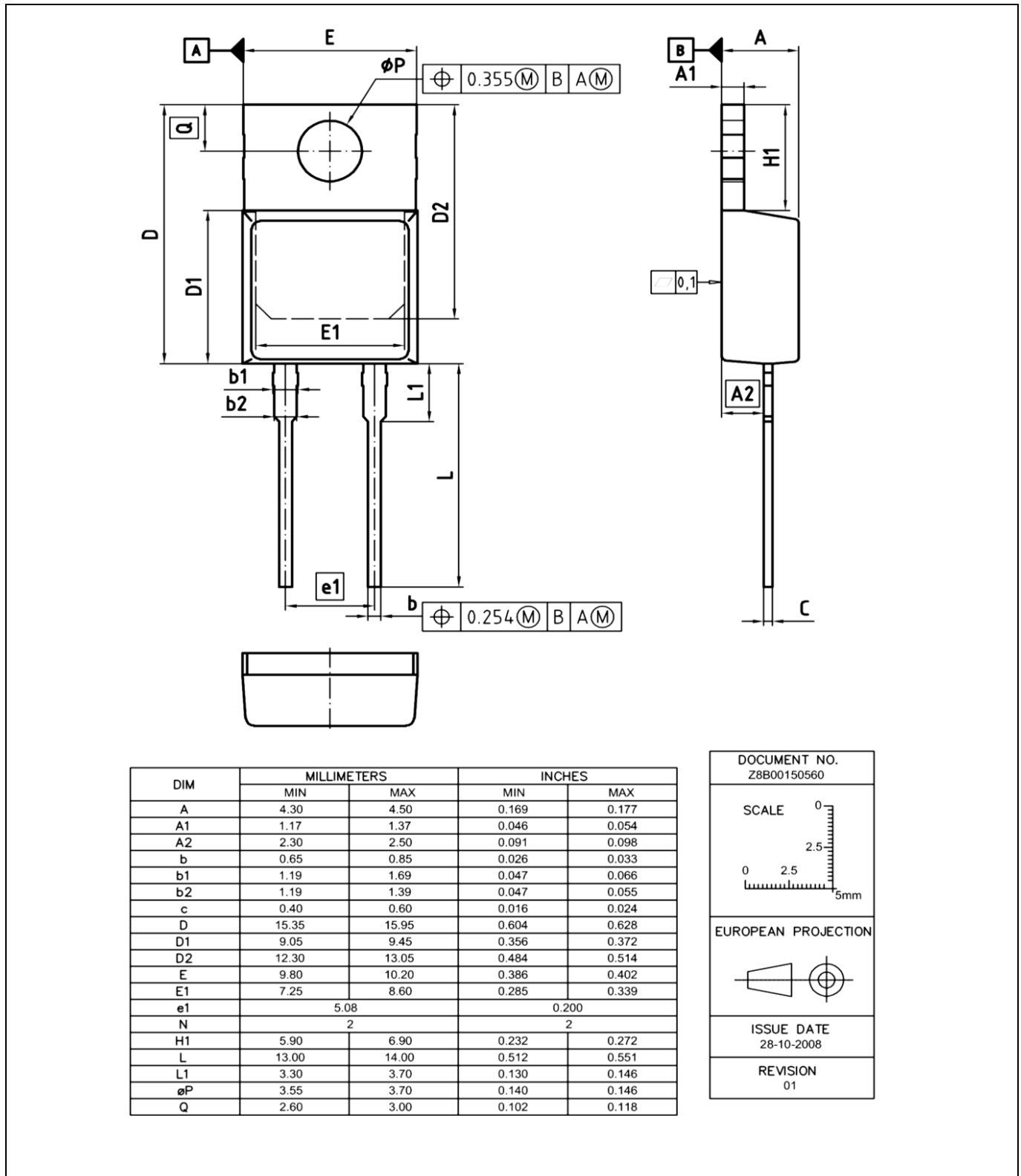ISSUE DATE
28-10-2008

REVISION
01

Figure 12   Outlines of the package PG-TO220-2, dimensions in mm/inches

Revision History

Major changes since the last revision

Revision	Date	Subject (major changes since last revision)
2.0	2017-05-23	Release of final version

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