

## Fast Switching Diode

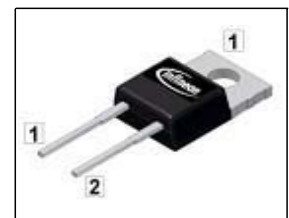
### Features

- 1200 V diode technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Qualified according to JEDEC for target applications

### Product Summary

$V_{RRM}$	1200	V
$I_F$	4	A
$V_F$	1.65	V
$T_{jmax}$	150	°C

PG-TO220-2



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDP04E120	PG-TO220-2	-	D04E120	C	A	-

### Maximum Ratings, at $T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continuous forward current	$I_F$	11.2 7.1	A
			$T_C=25\text{ °C}$
			$T_C=90\text{ °C}$
Surge non repetitive forward current	$I_{FSM}$	28	
			$T_C=25\text{ °C}$ , $t_p=10\text{ ms}$ , sine halfwave
Maximum repetitive forward current	$I_{FRM}$	16.5	
			$T_C=25\text{ °C}$ , $t_p$ limited by $T_{jmax}$ , $D=0.5$
Power dissipation	$P_{tot}$	43.1 20.6	W
			$T_C=25\text{ °C}$
			$T_C=90\text{ °C}$
Operating and storage temperature	$T_j, T_{stg}$	-55...+150	°C
Soldering temperature	$T_S$	260	°C
			wavesoldering, 1.6mm (0.063 in.) from case for 10s

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - case	$R_{thJC}$	-	-	2.9	K/W
Thermal resistance, junction - ambient, leaded	$R_{thJA}$	-	-	62	
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	-	62	
		-	35	-	

**Electrical Characteristics, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Reverse leakage current $V_R=1200\text{V}$ , $T_j=25^\circ\text{C}$ $V_R=1200\text{V}$ , $T_j=150^\circ\text{C}$	$I_R$	-	-	100 350	$\mu\text{A}$
Forward voltage drop $I_F=4\text{A}$ , $T_j=25^\circ\text{C}$ $I_F=4\text{A}$ , $T_j=150^\circ\text{C}$	$V_F$	-	1.65 1.7	2.15 -	V

<sup>0</sup>J-STD20 and JESD22

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

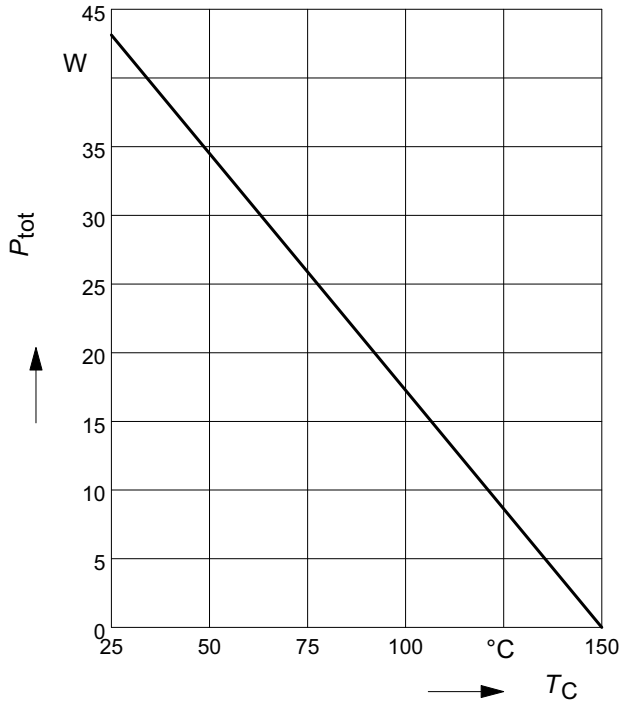
**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Reverse recovery time $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=25\text{°C}$ $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=125\text{°C}$ $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=150\text{°C}$	$t_{rr}$	- - -	115 180 185	- - -	ns
Peak reverse current $V_R=800\text{V}, I_F = 4\text{ A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=25\text{°C}$ $V_R=800\text{V}, I_F =4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=125\text{°C}$ $V_R=800\text{V}, I_F =4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=150\text{°C}$	$I_{rrm}$	- - -	7.15 8 8.1	- - -	A
Reverse recovery charge $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=25\text{°C}$ $V_R=800\text{V}, I_F =4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=125\text{°C}$ $V_R=800\text{V}, I_F =4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=150\text{°C}$	$Q_{rr}$	- - -	330 575 630	- - -	nC
Reverse recovery softness factor $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=25\text{°C}$ $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=125\text{°C}$ $V_R=800\text{V}, I_F=4\text{A}, di_F/dt=750\text{A}/\mu\text{s}, T_j=150\text{°C}$	S	- - -	6 7.8 7.8	- - -	

**1 Power dissipation**

$$P_{\text{tot}} = f(T_C)$$

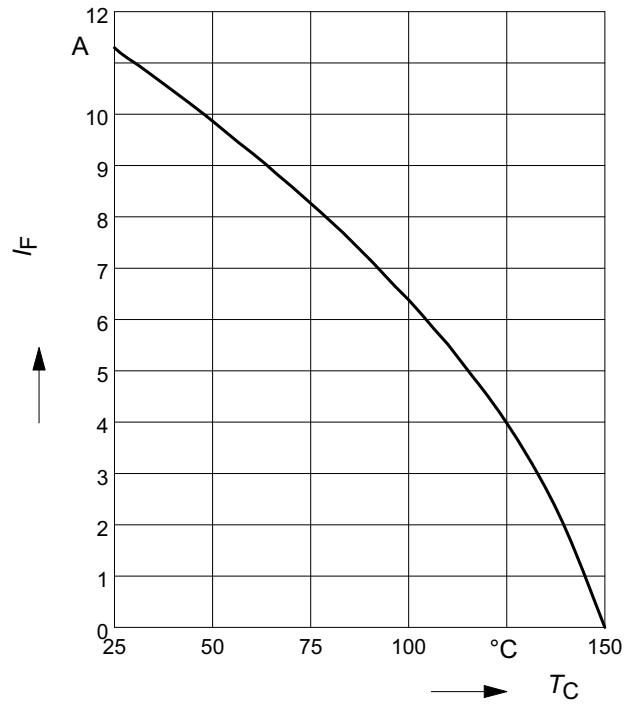
parameter:  $T_j \leq 150^\circ\text{C}$



**2 Diode forward current**

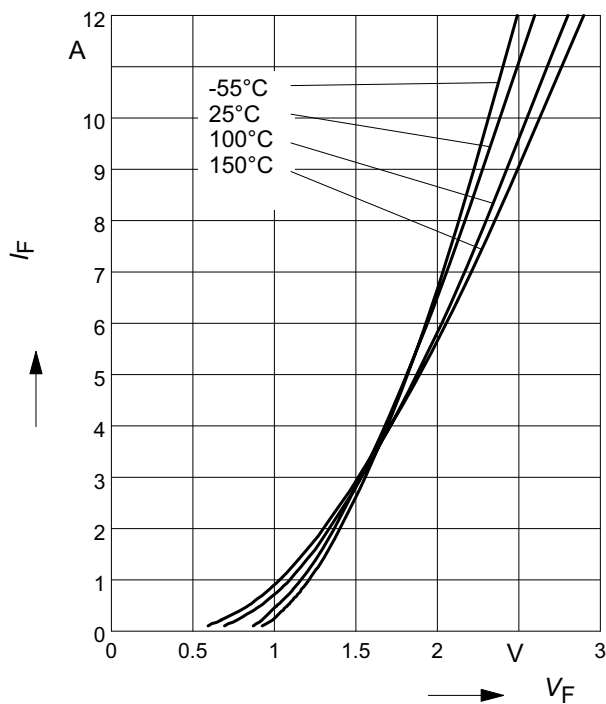
$$I_F = f(T_C)$$

parameter:  $T_j \leq 150^\circ\text{C}$



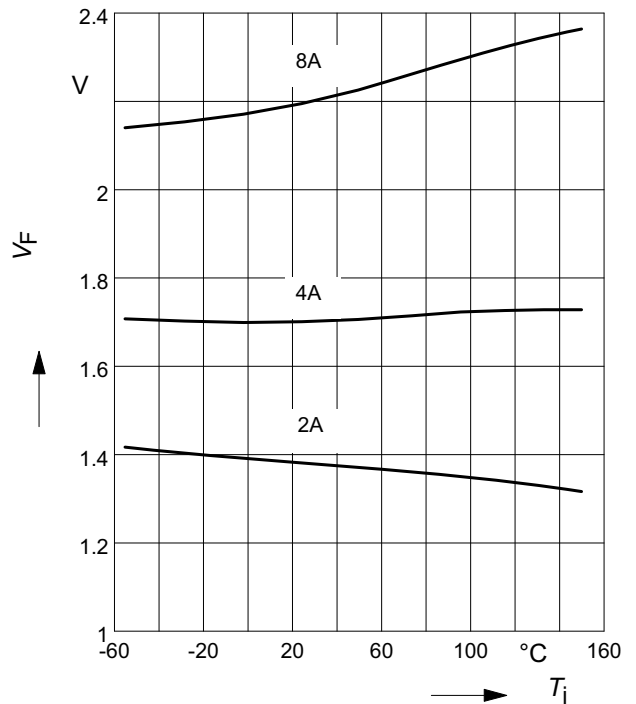
**3 Typ. diode forward current**

$$I_F = f(V_F)$$



**4 Typ. diode forward voltage**

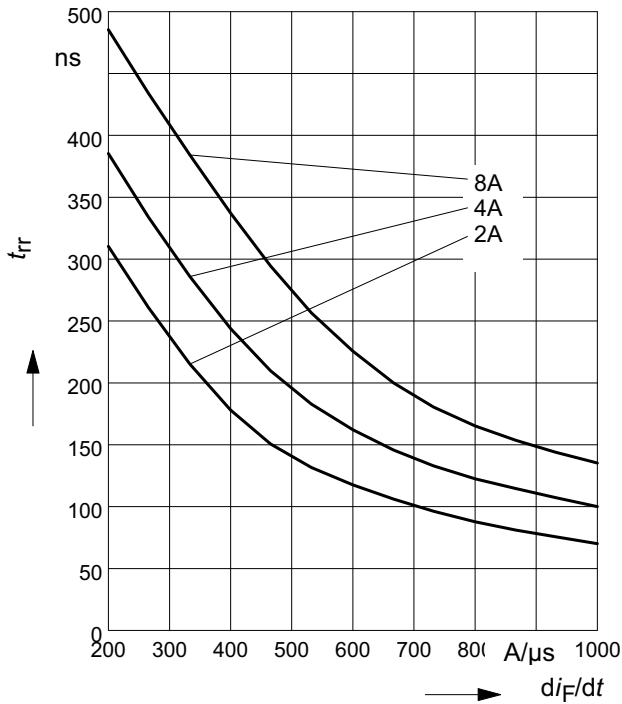
$$V_F = f(T_j)$$



**5 Typ. reverse recovery time**

$t_{rr} = f(dI_F/dt)$

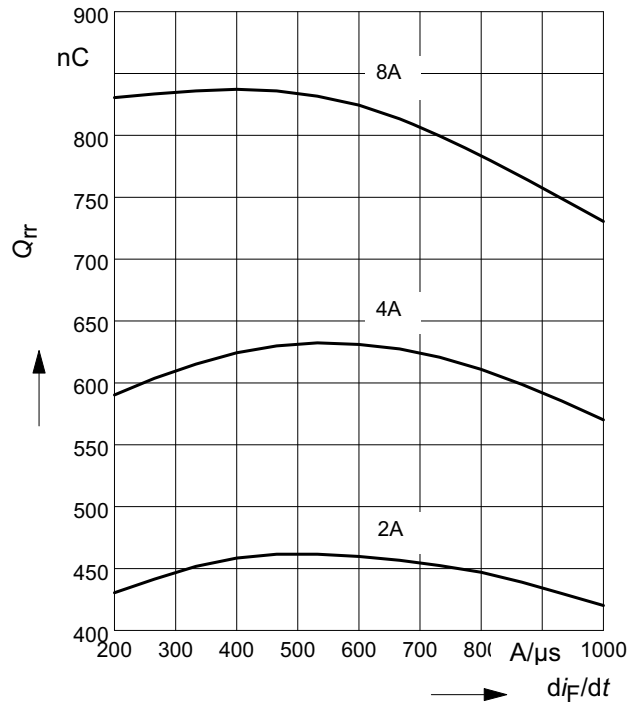
parameter:  $V_R = 800V, T_j = 125^\circ C$



**6 Typ. reverse recovery charge**

$Q_{rr} = f(dI_F/dt)$

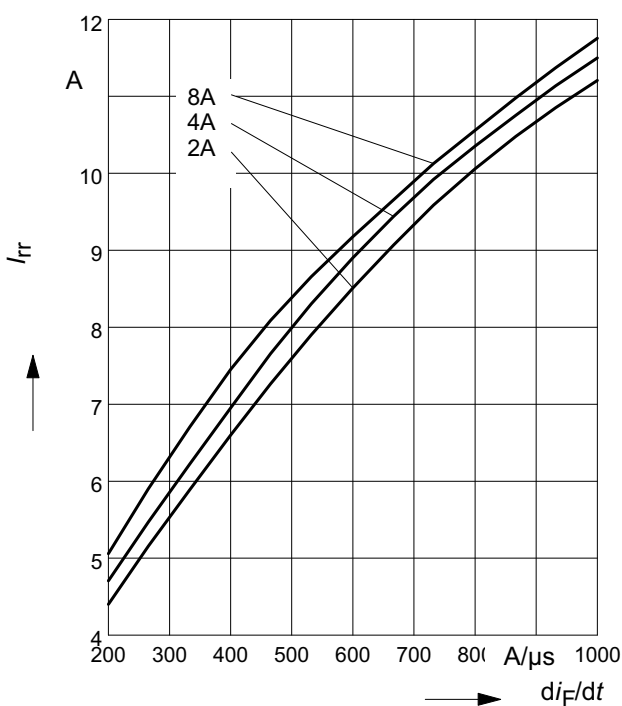
parameter:  $V_R = 800V, T_j = 125^\circ C$



**7 Typ. reverse recovery current**

$I_{rr} = f(dI_F/dt)$

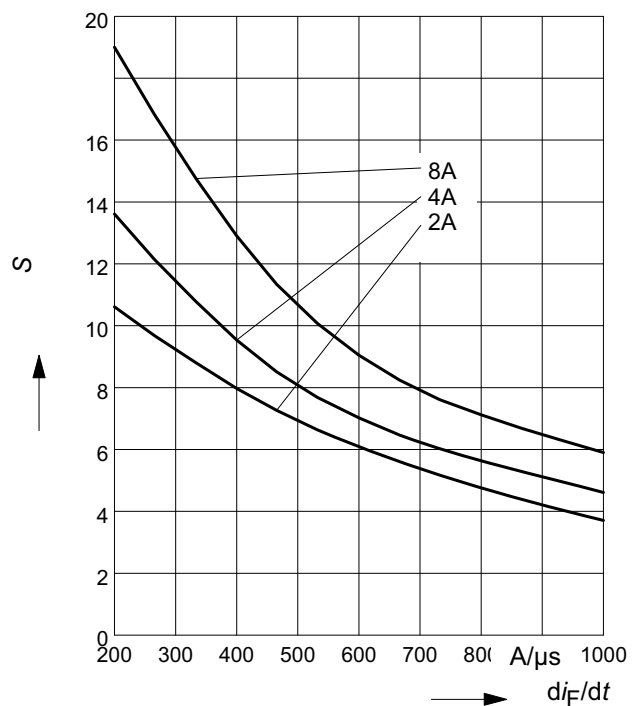
parameter:  $V_R = 800V, T_j = 125^\circ C$



**8 Typ. reverse recovery softness factor**

$S = f(dI_F/dt)$

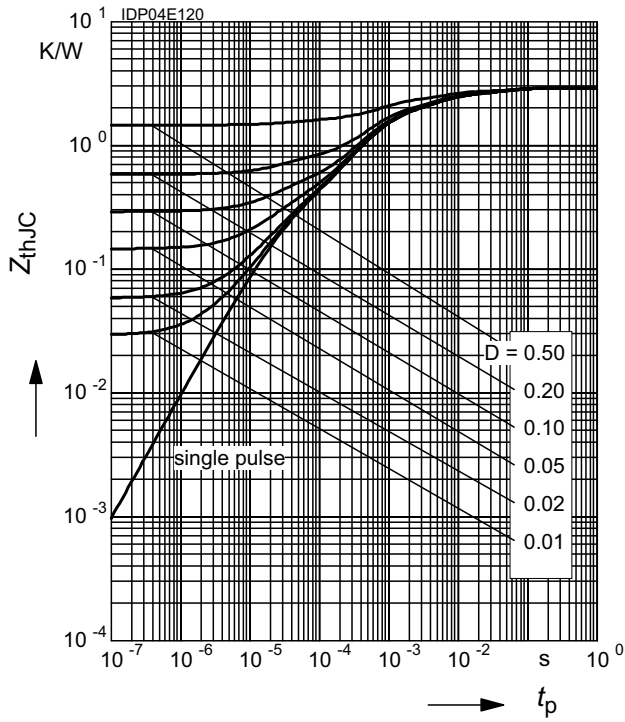
parameter:  $V_R = 800V, T_j = 125^\circ C$



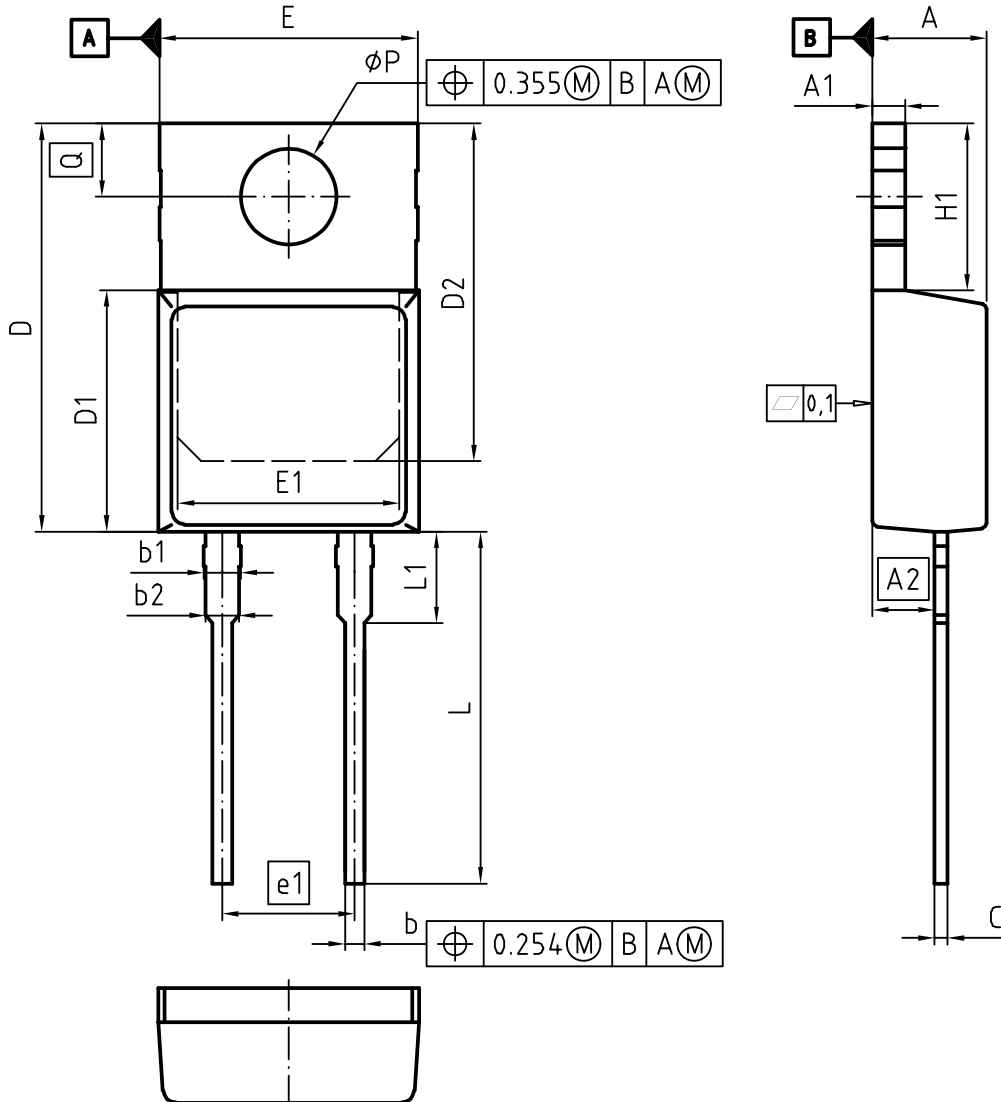
**9 Max. transient thermal impedance**

$$Z_{thJC} = f(t_p)$$

parameter :  $D = t_p/T$



TO-220-2



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
$\phi P$	3.55	3.70	0.140	0.146
Q	2.60	3.00	0.102	0.118

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