

## Fast Switching EmCon Diode

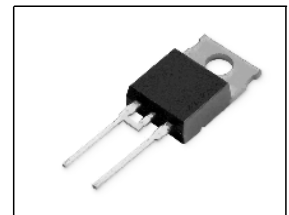
### Feature

- 1200 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>0)</sup> for target applications

### Product Summary

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

PG-TO220-2-2.



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDP04E120	PG-TO220-2-2.	-	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.

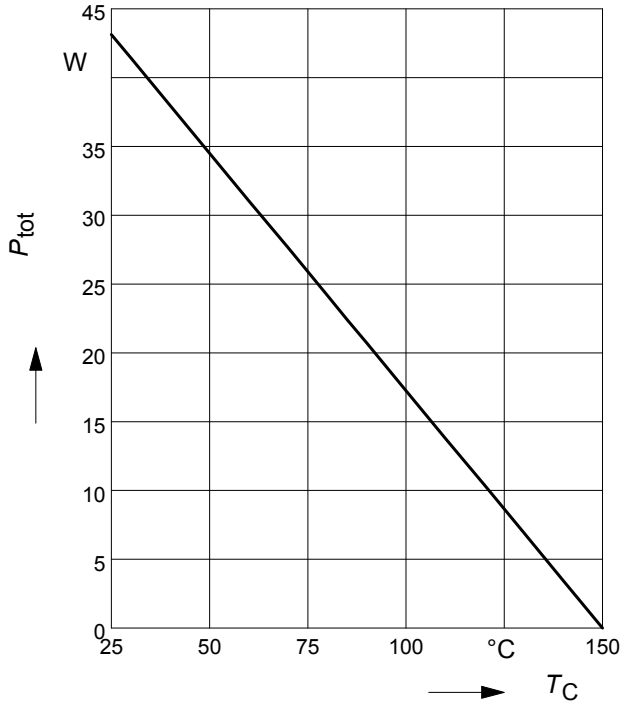
**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

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**

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

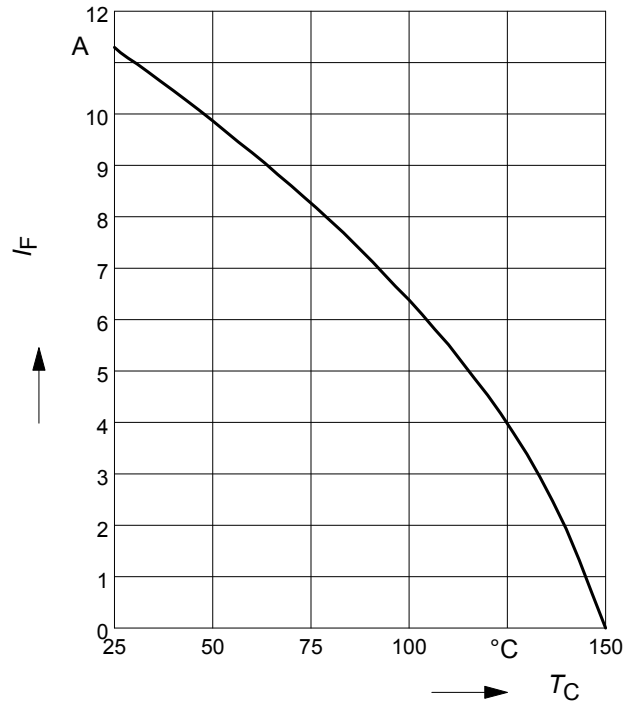
parameter:  $T_j \leq 150^\circ\text{C}$



**2 Diode forward current**

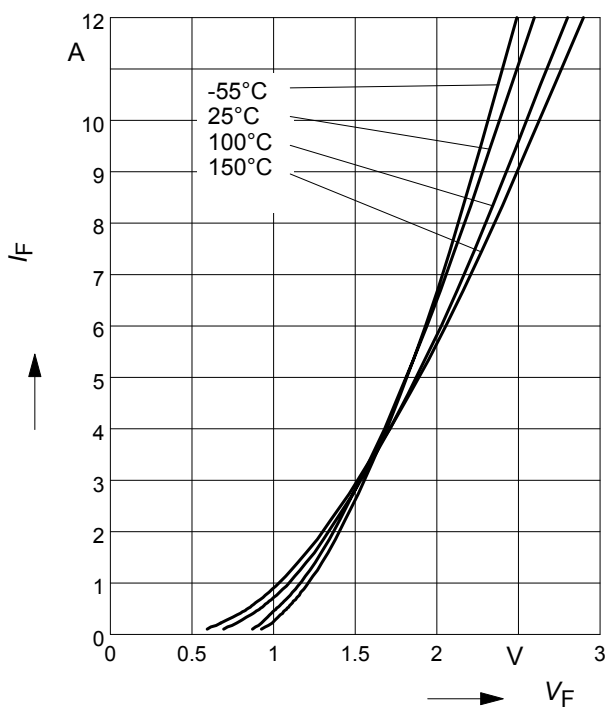
$$I_F = f(T_C)$$

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



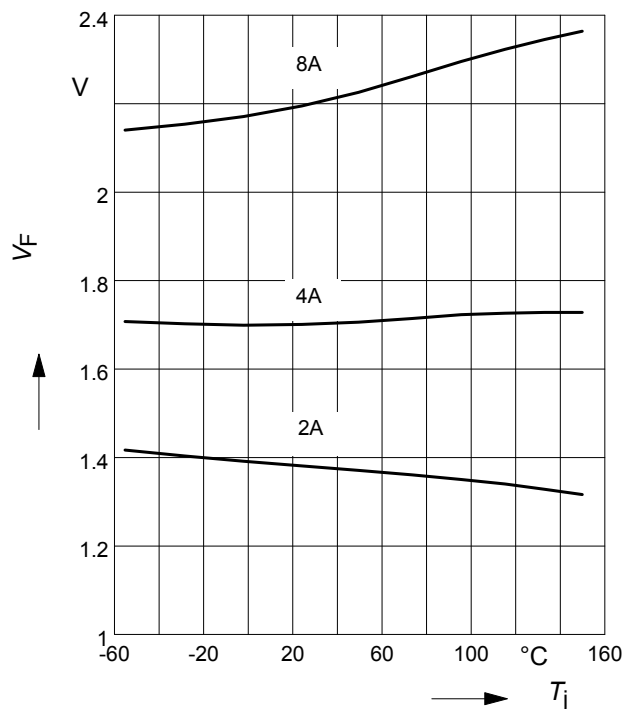
**3 Typ. diode forward current**

$$I_F = f(V_F)$$



**4 Typ. diode forward voltage**

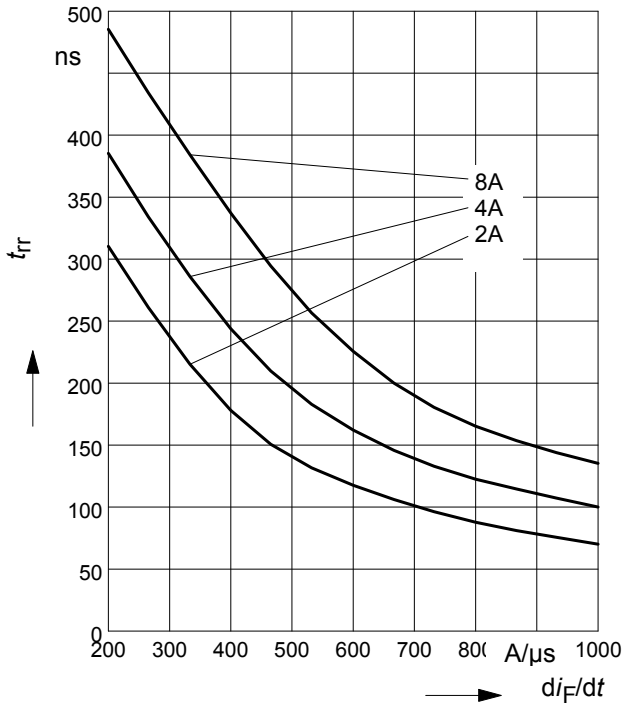
$$V_F = f(T_j)$$



**5 Typ. reverse recovery time**

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

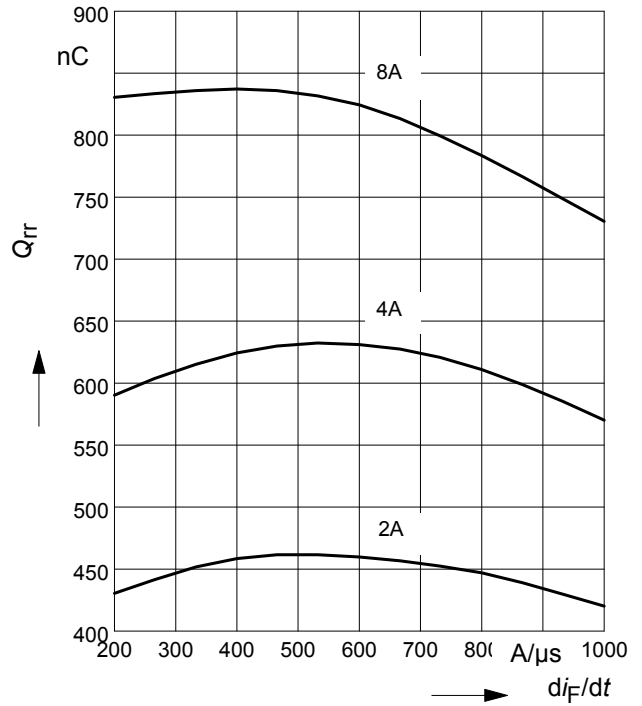
parameter:  $V_R = 800V, T_j = 125^\circ C$



**6 Typ. reverse recovery charge**

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

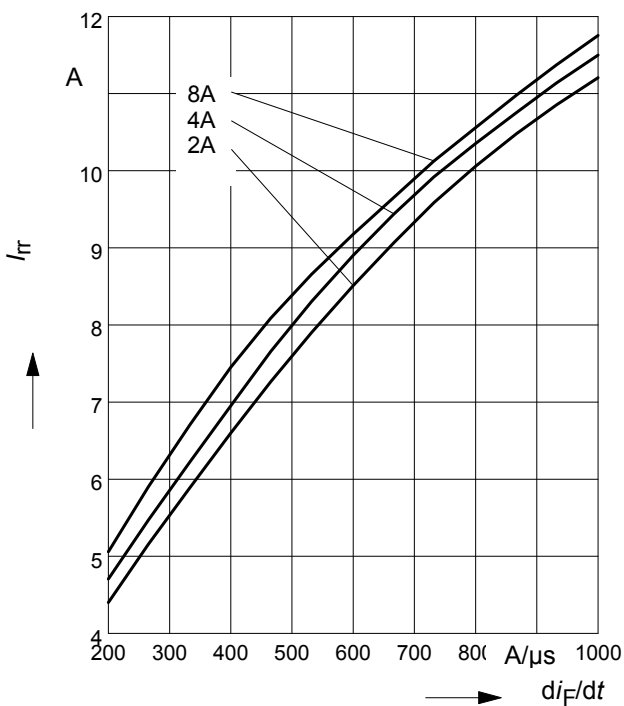
parameter:  $V_R = 800V, T_j = 125^\circ C$



**7 Typ. reverse recovery current**

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

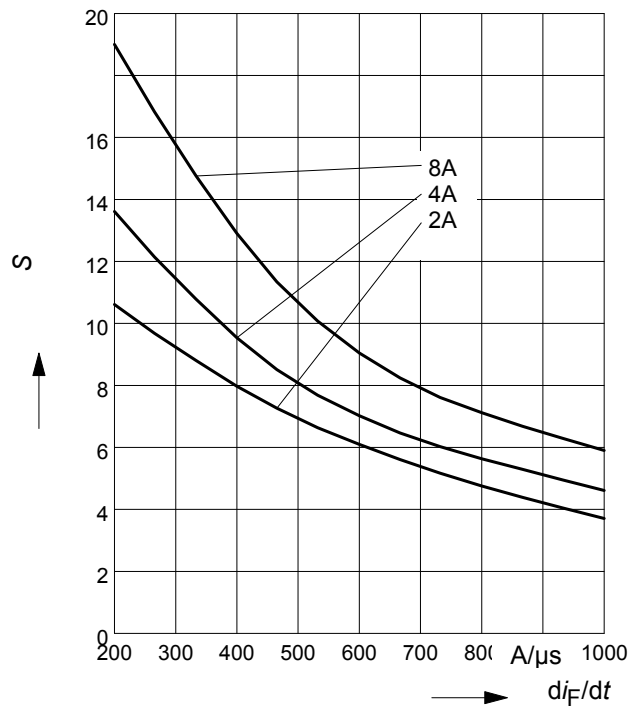
parameter:  $V_R = 800V, T_j = 125^\circ C$



**8 Typ. reverse recovery softness factor**

$$S = f(di_F/dt)$$

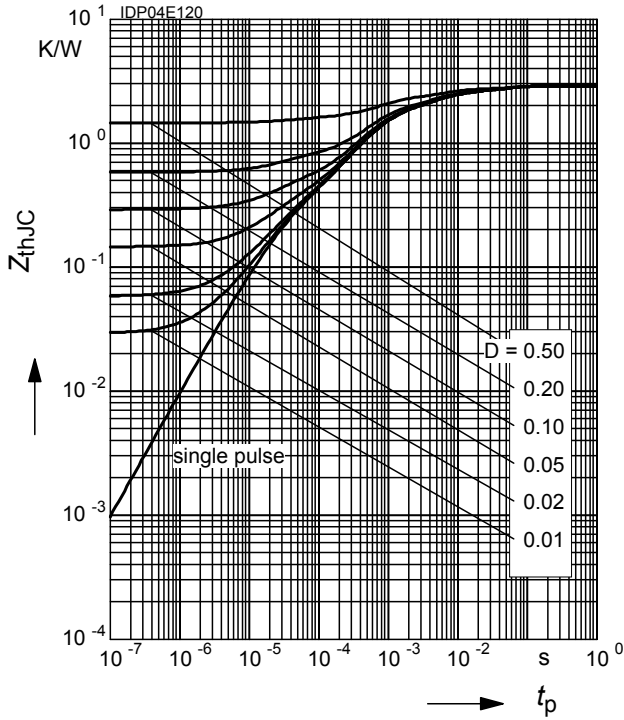
parameter:  $V_R = 800V, T_j = 125^\circ C$



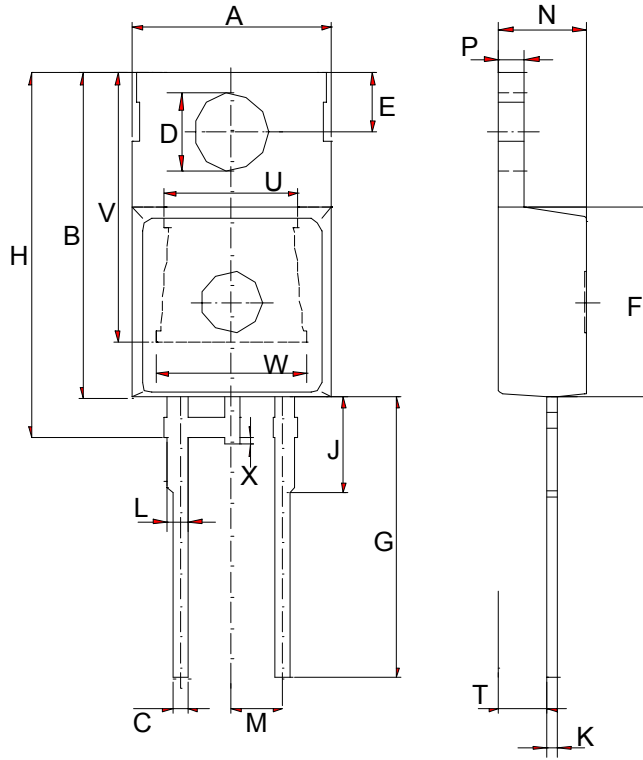
**9 Max. transient thermal impedance**

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

parameter :  $D = t_p/T$



TO-220-2-2



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.70	10.10	0.3819	0.3976
B	15.30	15.90	0.6024	0.6260
C	0.65	0.85	0.0256	0.0335
D	3.55	3.85	0.1398	0.1516
E	2.60	3.00	0.1024	0.1181
F	9.00	9.40	0.3543	0.3701
G	13.00	14.00	0.5118	0.5512
H	17.20	17.80	0.6772	0.7008
J	4.40	4.80	0.1732	0.1890
K	0.40	0.60	0.0157	0.0236
L	1.05 typ.		0.41 typ.	
M	2.54 typ.		0.1 typ.	
N	4.4 typ.		0.173 typ.	
P	1.10	1.40	0.0433	0.0551
T	2.4 typ.		0.095 typ.	
U	6.6 typ.		0.26 typ.	
V	13.0 typ.		0.51 typ.	
W	7.5 typ.		0.295 typ.	
X	0.00	0.40	0.0000	0.0157

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