

## Fast Switching EmCon Diode

### Feature

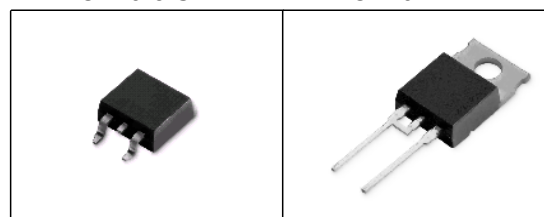
- 1200 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling

### Product Summary

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

P-TO220-3.SMD

P-TO220-2-2.



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDP04E120	P-TO220-2-2.	Q67040-S4388	D04E120	C	A	-
IDB04E120	P-TO220-3.SMD	Q67040-S4386	D04E120	NC	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
1.6mm(0.063 in.) from case for 10s			

### Thermal Characteristics

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

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

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

<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.

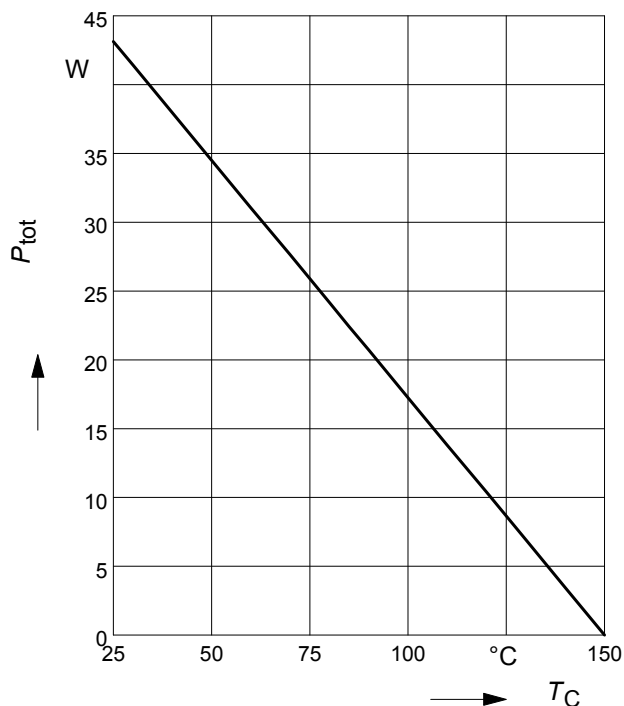
**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

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

### 1 Power dissipation

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

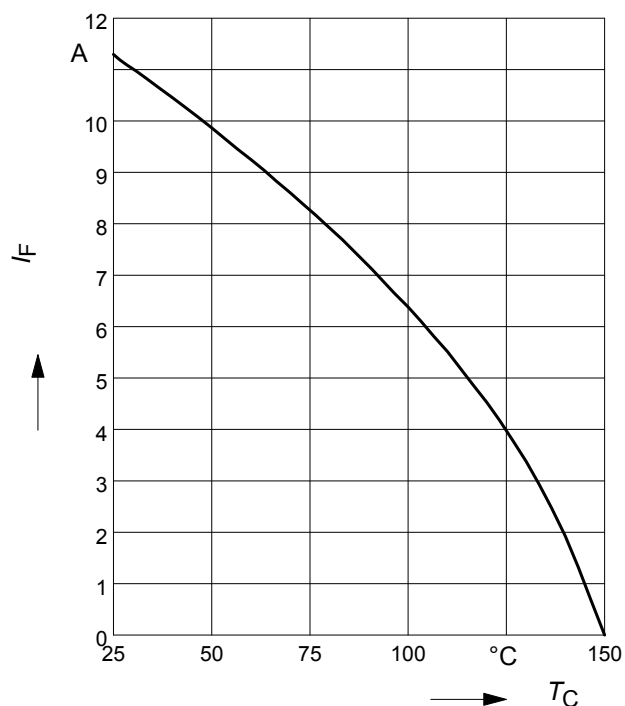
parameter:  $T_j \leq 150^\circ\text{C}$



### 2 Diode forward current

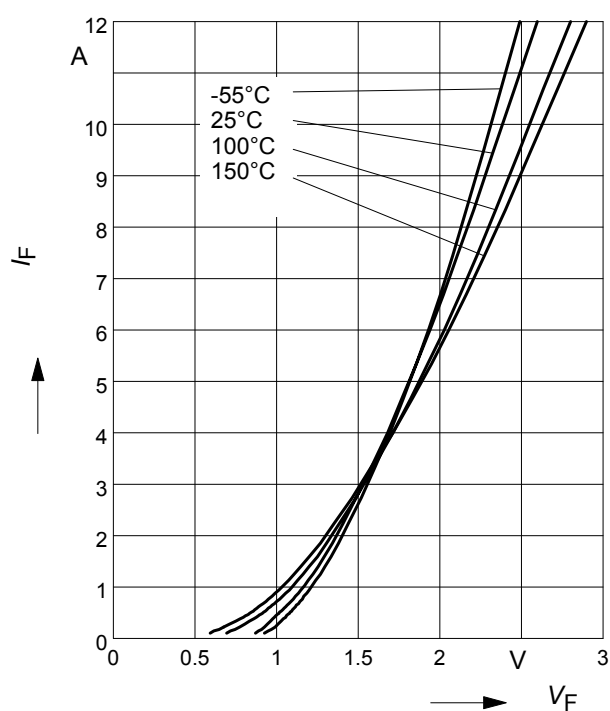
$$I_F = f(T_C)$$

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



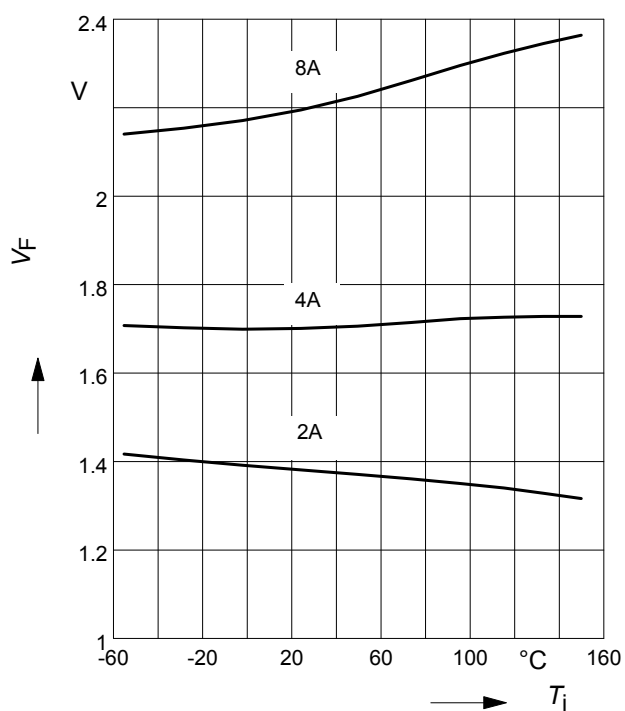
### 3 Typ. diode forward current

$$I_F = f(V_F)$$



### 4 Typ. diode forward voltage

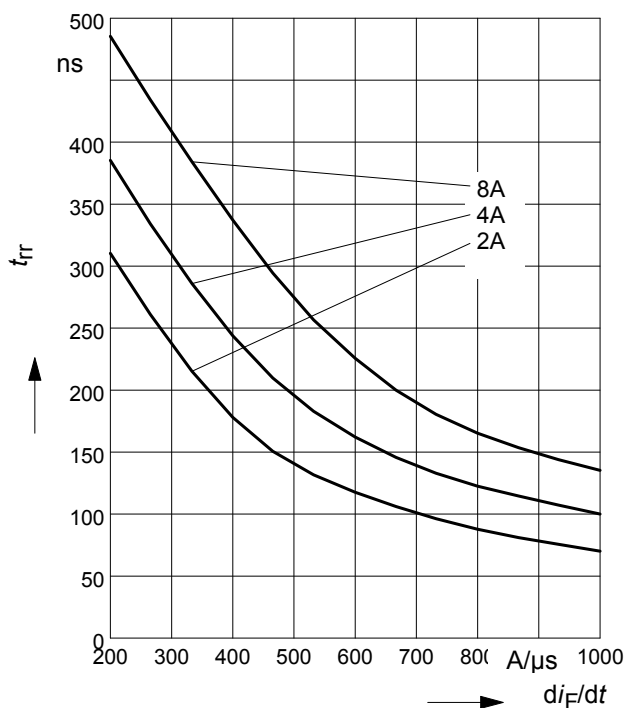
$$V_F = f(T_j)$$



### 5 Typ. reverse recovery time

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

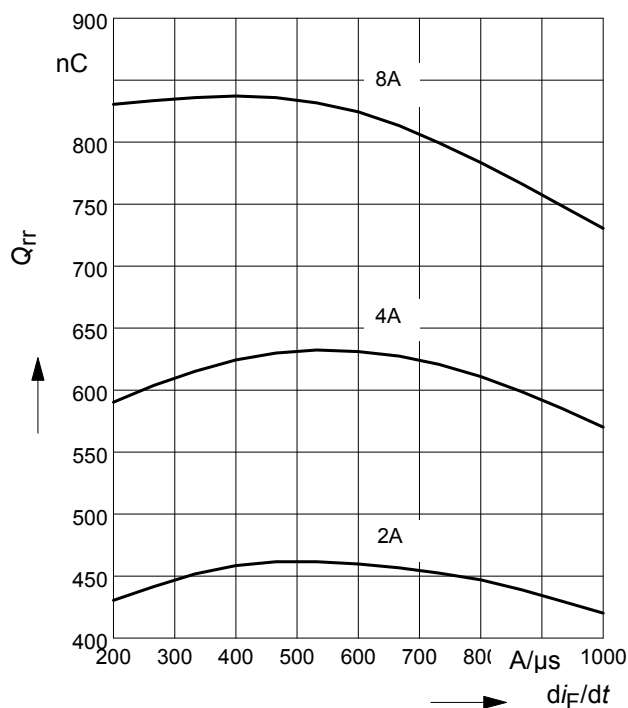
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 6 Typ. reverse recovery charge

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

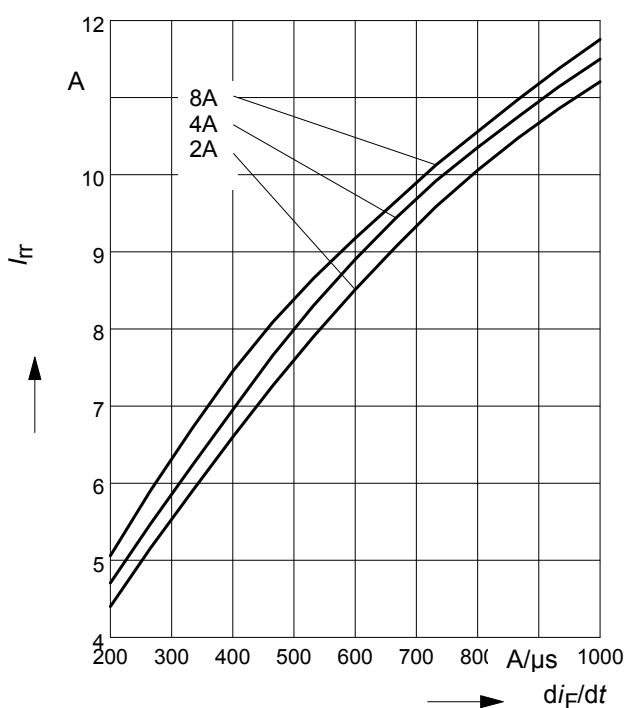
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 7 Typ. reverse recovery current

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

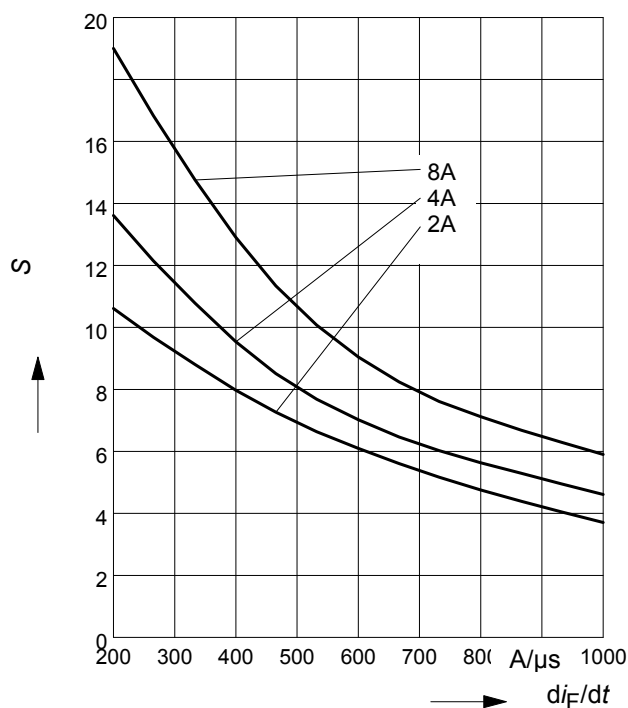
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 8 Typ. reverse recovery softness factor

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

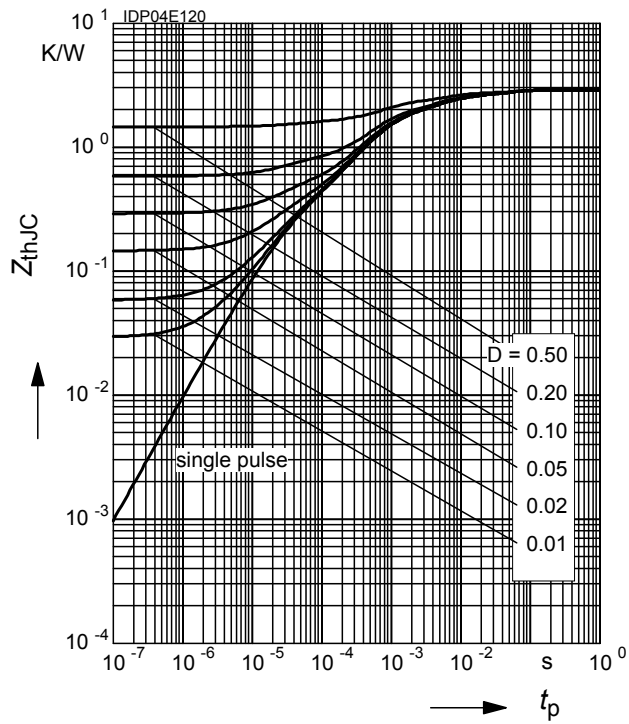
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



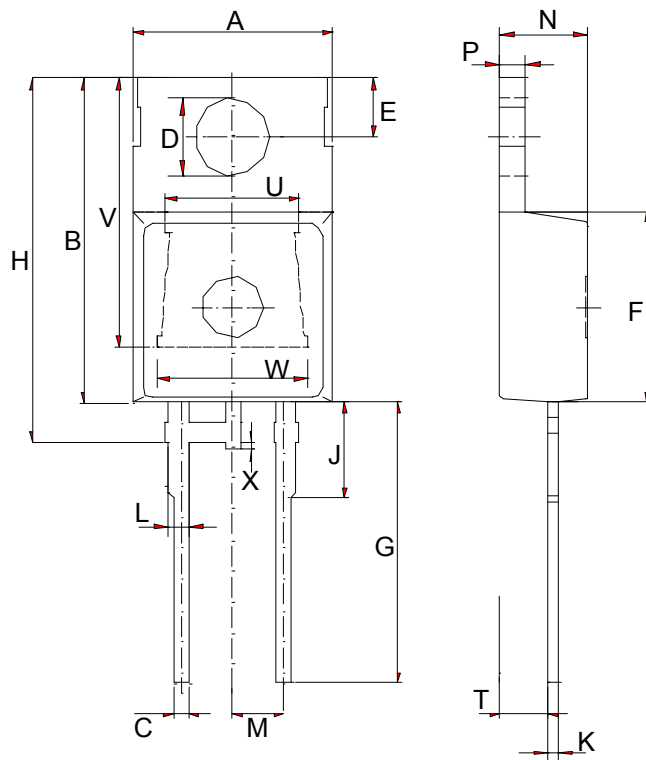
## 9 Max. transient thermal impedance

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

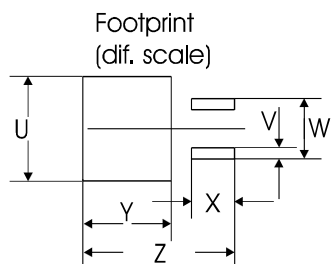
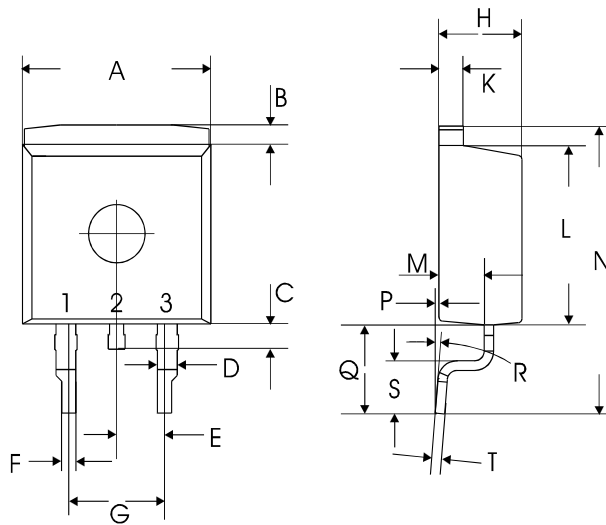
parameter :  $D = t_p/T$



TO-220-2-2



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



TO-220-3-45 (P-TO220SMD)

symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.00	0.3858	0.3937
B	1.3 typ.		0.0512 typ.	
C	1.25	1.75	0.0492	0.0689
D	0.95	1.15	0.0374	0.0453
E	2.54 typ.		0.1 typ.	
F	0.72	0.85	0.0283	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.28	1.40	0.0504	0.0551
L	9.00	9.40	0.3543	0.3701
M	2.30	2.50	0.0906	0.0984
N	14.1 typ.		0.5551 typ.	
P	0.00	0.20	0.0000	0.0079
Q	3.30	3.90	0.1299	0.1535
R	8° max		8° max	
S	1.70	2.50	0.0669	0.0984
T	0.50	0.65	0.0197	0.0256
U	10.8 typ.		0.4252 typ.	
V	1.35 typ.		0.0532 typ.	
W	6.43 typ.		0.2532 typ.	
X	4.60 typ.		0.1811 typ.	
Y	9.40 typ.		0.3701 typ.	
Z	16.15 typ.		0.6358 typ.	



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