

Fast Switching EmCon Diode

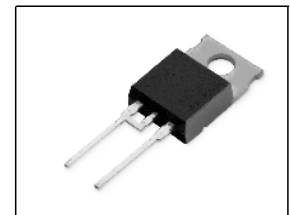
Feature

- 600 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- 175°C operating temperature
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC⁰⁾ for target applications

Product Summary

V_{RRM}	600	V
I_F	45	A
V_F	1.5	V
T_{jmax}	175	°C

PG-TO220-2-2.



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDP45E60	PG-TO220-2-2.	-	D45E60	C	A	-

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

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	600	V
Continuous forward current	I_F	45	A
$T_C=25\text{ °C}$		71	
$T_C=90\text{ °C}$		47	
Surge non repetitive forward current	I_{FSM}	162	
$T_C=25\text{ °C}$, $t_p=10\text{ ms}$, sine halfwave			
Maximum repetitive forward current	I_{FRM}	111.5	
$T_C=25\text{ °C}$, t_p limited by T_{jmax} , $D=0.5$			
Power dissipation	P_{tot}	187	W
$T_C=25\text{ °C}$		106	
$T_C=90\text{ °C}$			
Operating and storage temperature	T_j, T_{stg}	-55...+175	°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.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	0.8	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾	R_{thJA}	-	-	62	
		-	35	-	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Reverse leakage current $V_R=600\text{V}$, $T_j=25\text{ }^\circ\text{C}$ $V_R=600\text{V}$, $T_j=150\text{ }^\circ\text{C}$	I_R	-	-	50 3000	μA
Forward voltage drop $I_F=45\text{A}$, $T_j=25\text{ }^\circ\text{C}$ $I_F=45\text{A}$, $T_j=150\text{ }^\circ\text{C}$	V_F	-	1.5 1.5	2 -	V

⁰J-STD20 and JESD22

¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

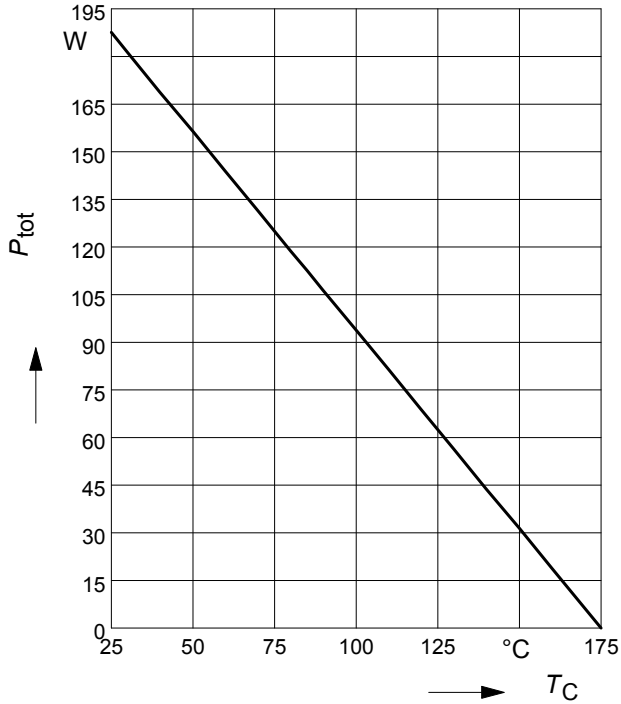
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Reverse recovery time $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$	t_{rr}	-	140	-	ns
Peak reverse current $V_R=400\text{V}$, $I_F = 45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F = 45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F = 45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$	I_{rrm}	-	23	-	A
Reverse recovery charge $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F = 45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F = 45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$	Q_{rr}	-	1400	-	nC
Reverse recovery softness factor $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F=45\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$	S	-	3.1	-	

1 Power dissipation

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

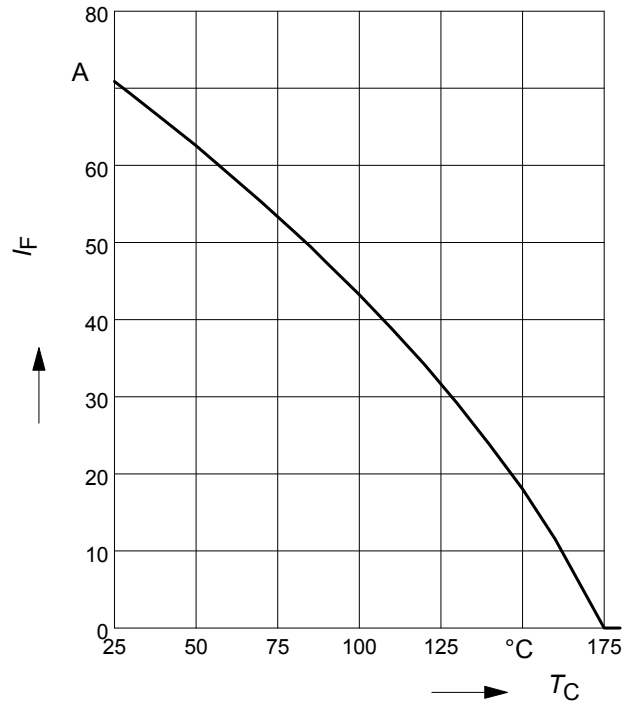
parameter: $T_j \leq 175\text{ }^\circ\text{C}$



2 Diode forward current

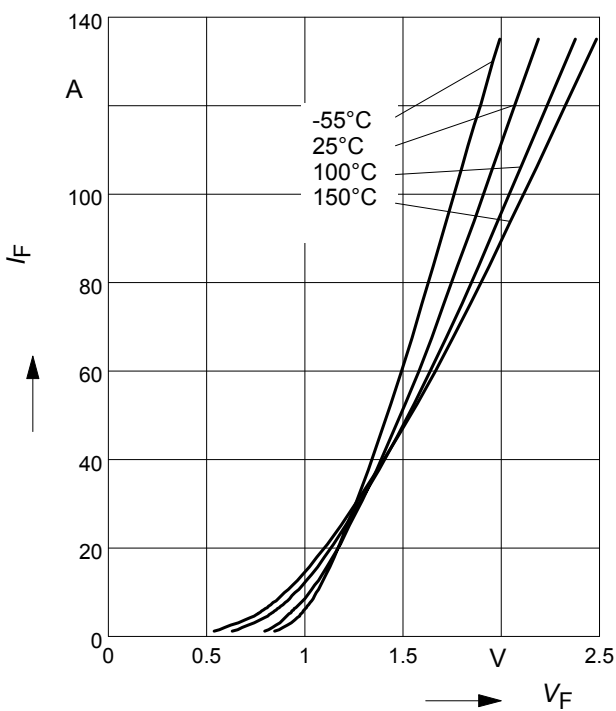
$$I_F = f(T_C)$$

parameter: $T_j \leq 175\text{ }^\circ\text{C}$



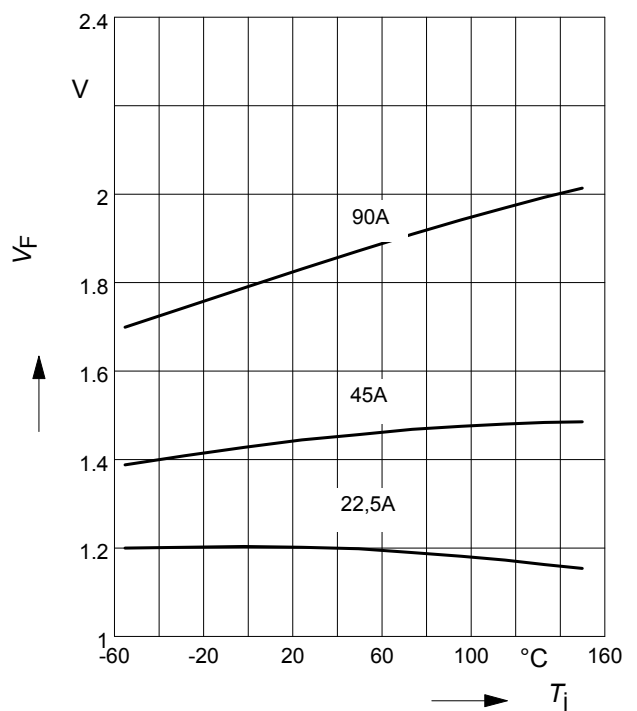
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

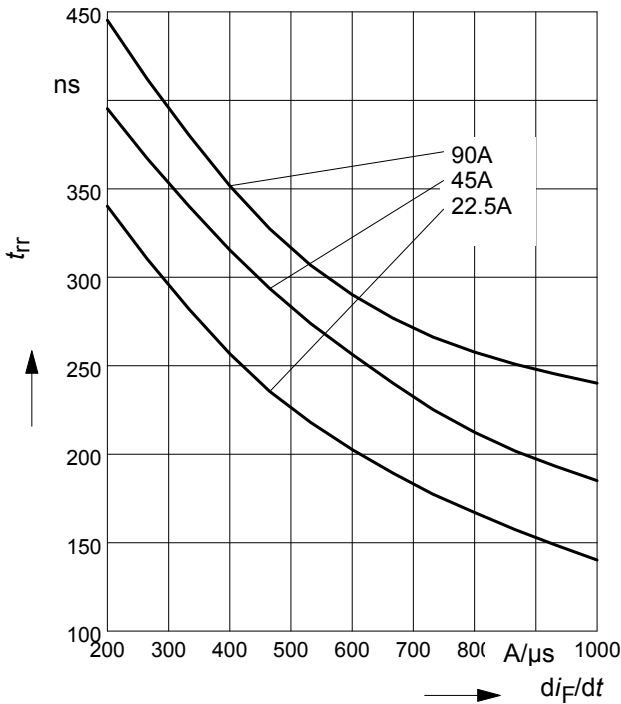
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

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

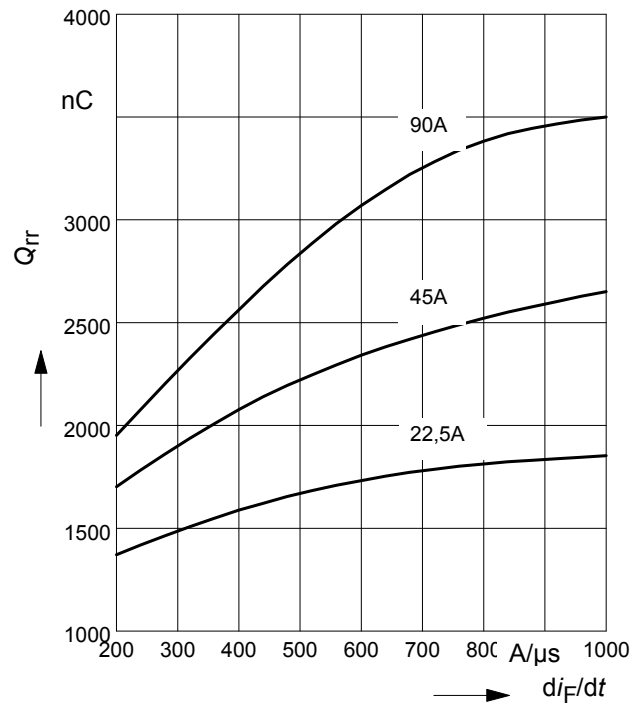
parameter: $V_R = 400V, T_j = 125^\circ C$



6 Typ. reverse recovery charge

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

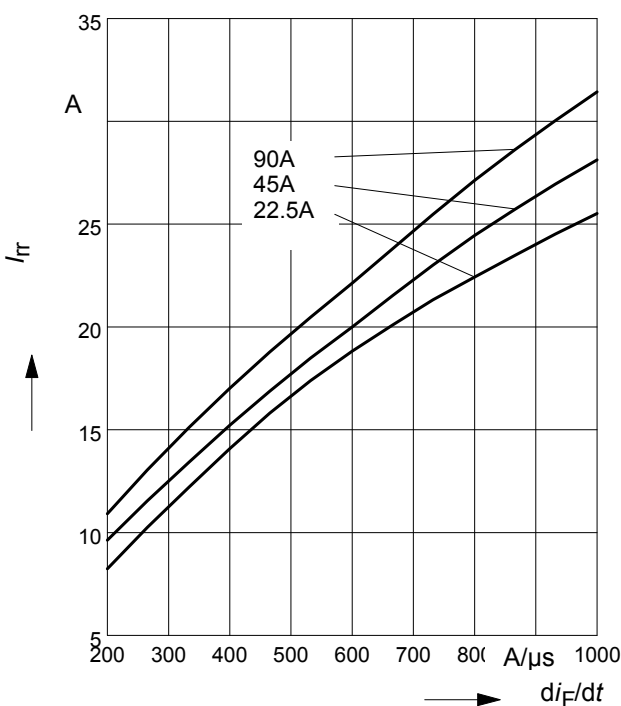
parameter: $V_R = 400V, T_j = 125^\circ C$



7 Typ. reverse recovery current

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

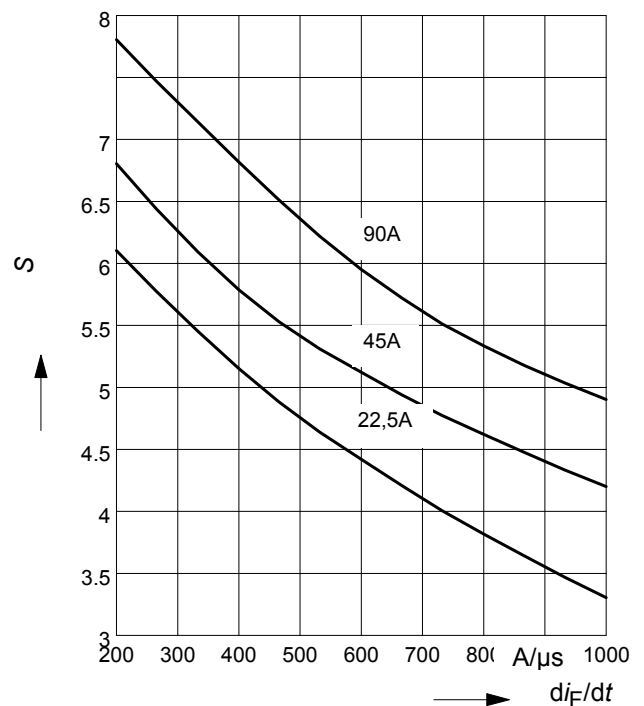
parameter: $V_R = 400V, T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

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

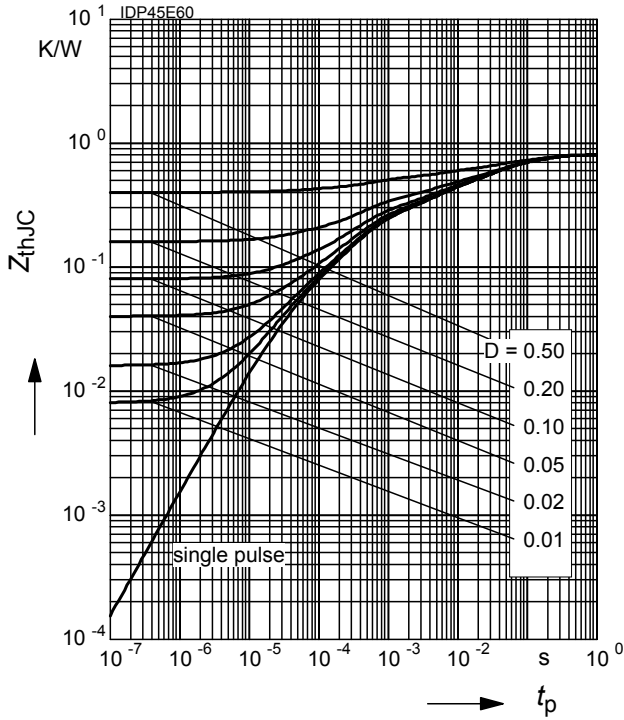
parameter: $V_R = 400V, T_j = 125^\circ C$



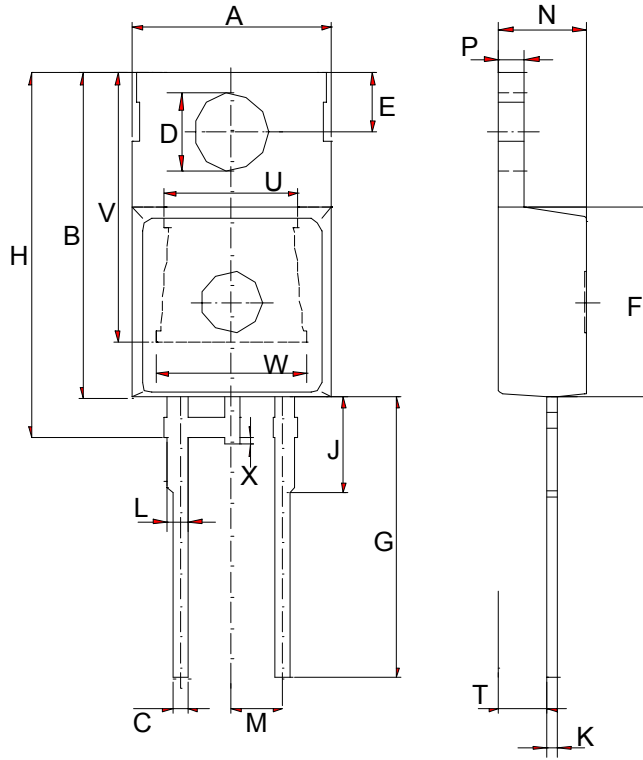
9 Max. transient thermal impedance

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

parameter : $D = t_p/T$



PG-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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