

## Fast Switching EmCon Diode

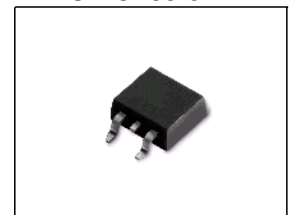
### Feature

- 600 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- 175°C operating temperature
- Easy paralleling
- Qualified according to JEDEC<sup>0)</sup> for target applications

### Product Summary

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

PG-TO263-3-2



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDB45E60	PG-TO263-3-2	-	D45E60	NC	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	$T_S$	245	°C
reflow soldering, MSL1			

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
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 <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 $V_R=600\text{V}$ , $T_j=25\text{ }^\circ\text{C}$ $V_R=600\text{V}$ , $T_j=150\text{ }^\circ\text{C}$	$I_R$	-	-	50 3000	$\mu\text{A}$
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

<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.

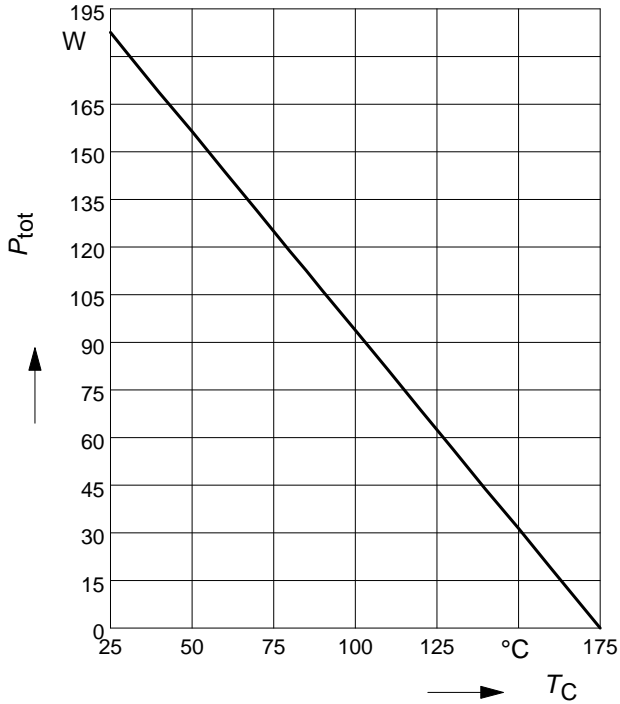
**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Reverse recovery time $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=25\text{°C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=125\text{°C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=150\text{°C}$	$t_{rr}$	-	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**

$P_{tot} = f(T_C)$

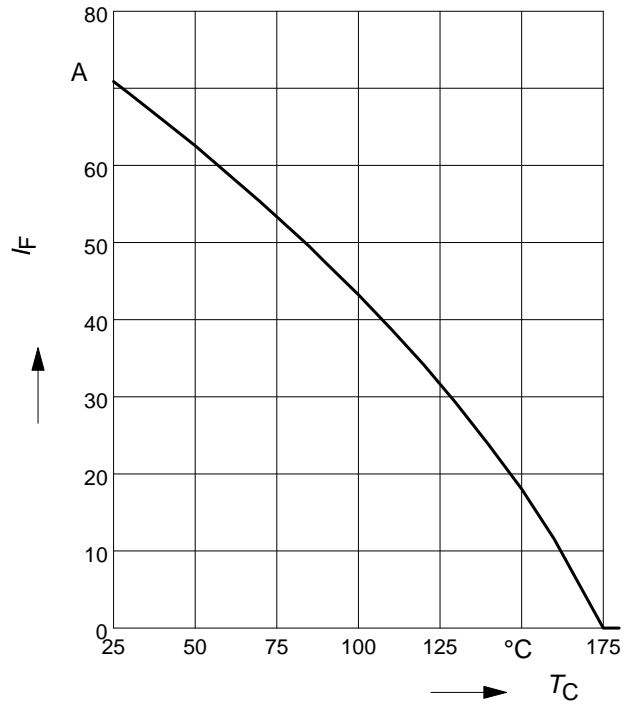
parameter:  $T_j \leq 175\text{ °C}$



**2 Diode forward current**

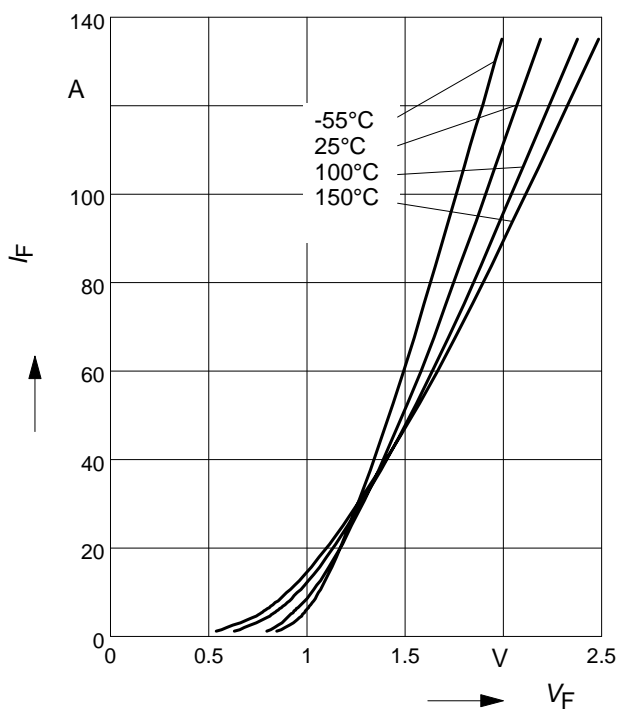
$I_F = f(T_C)$

parameter:  $T_j \leq 175\text{ °C}$



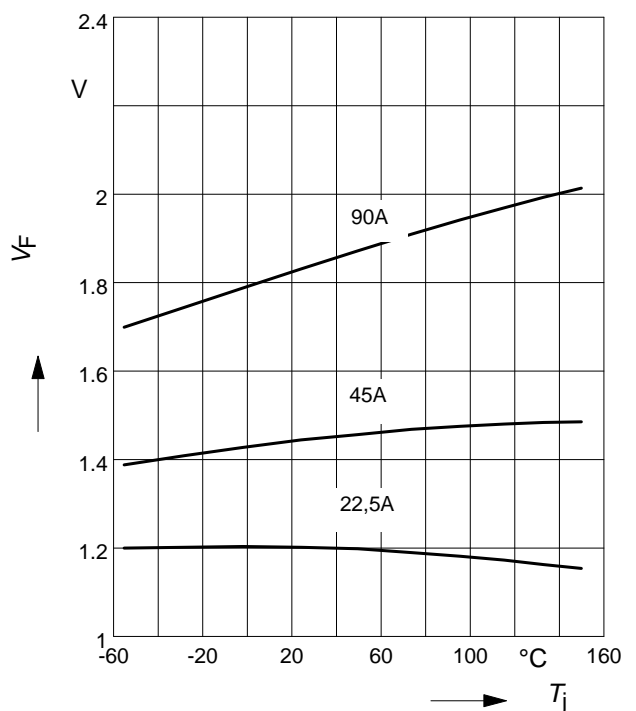
**3 Typ. diode forward current**

$I_F = f(V_F)$



**4 Typ. diode forward voltage**

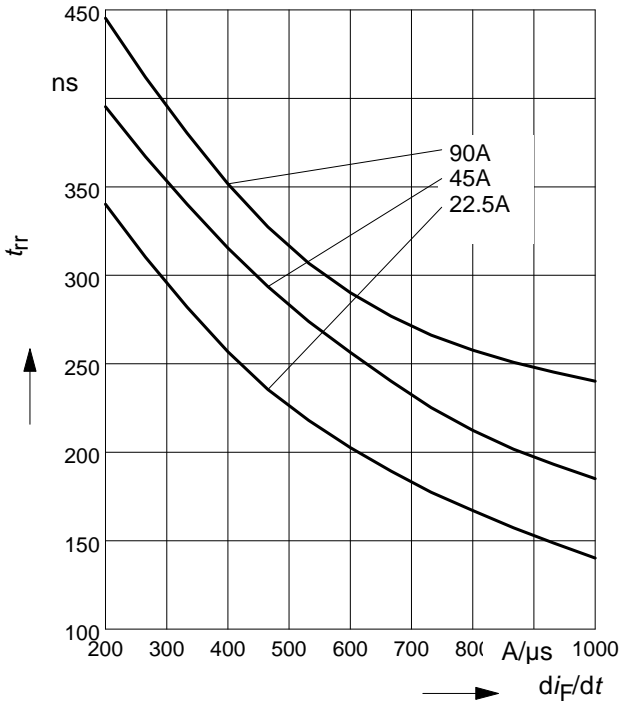
$V_F = f(T_j)$



**5 Typ. reverse recovery time**

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

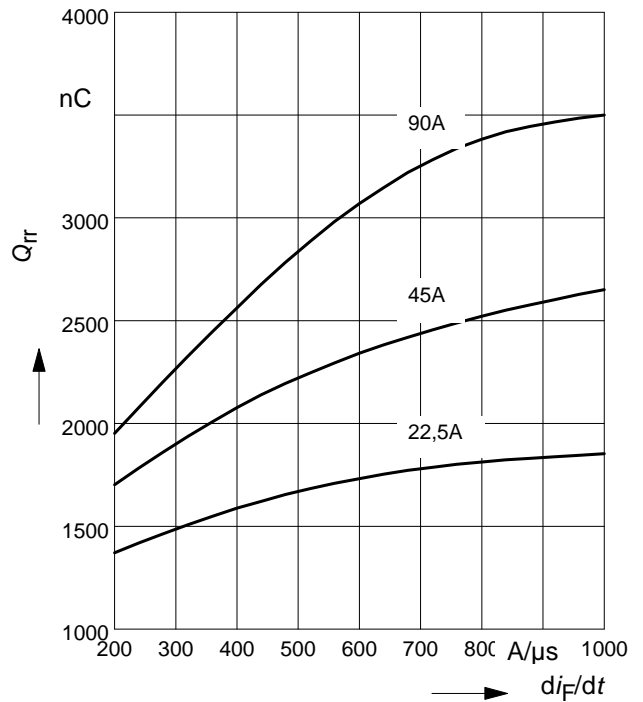
parameter:  $V_R = 400V, T_j = 125^\circ C$



**6 Typ. reverse recovery charge**

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

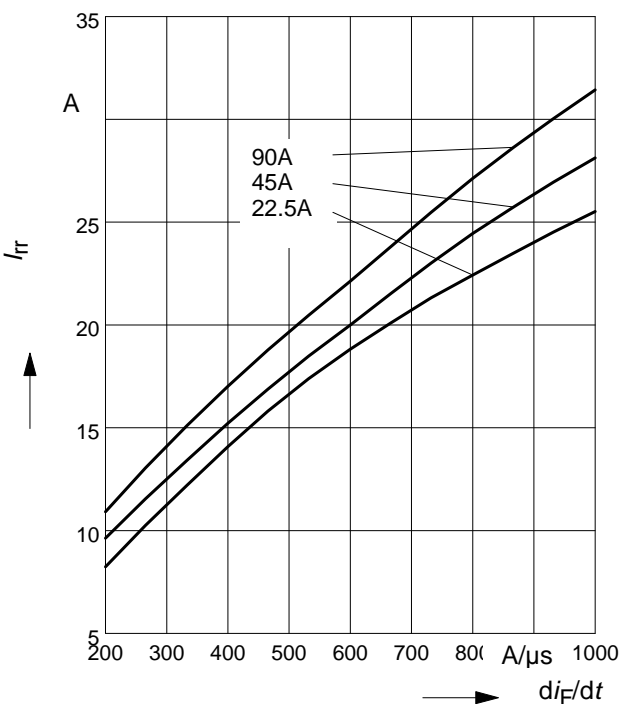
parameter:  $V_R = 400V, T_j = 125^\circ C$



**7 Typ. reverse recovery current**

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

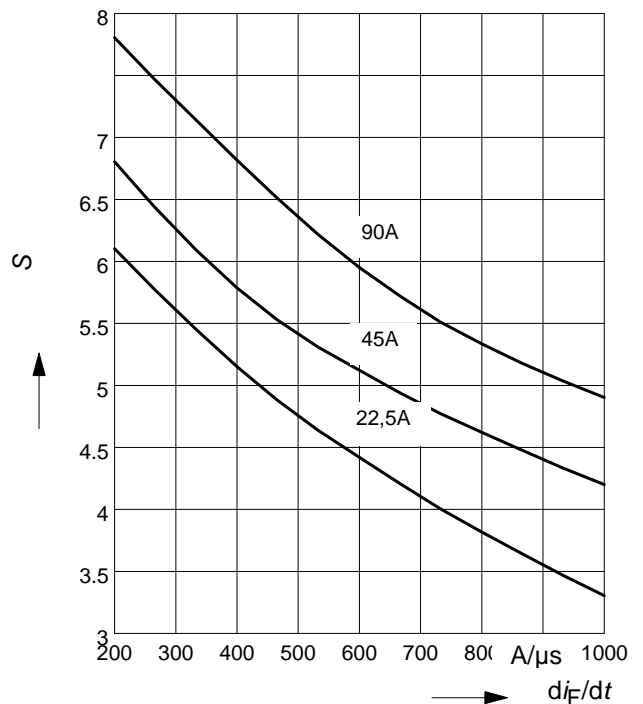
parameter:  $V_R = 400V, T_j = 125^\circ C$



**8 Typ. reverse recovery softness factor**

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

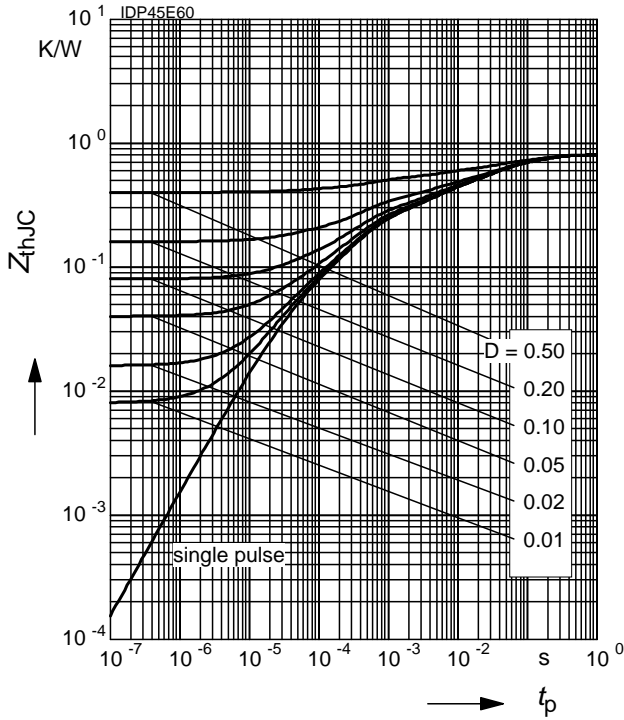
parameter:  $V_R = 400V, T_j = 125^\circ C$

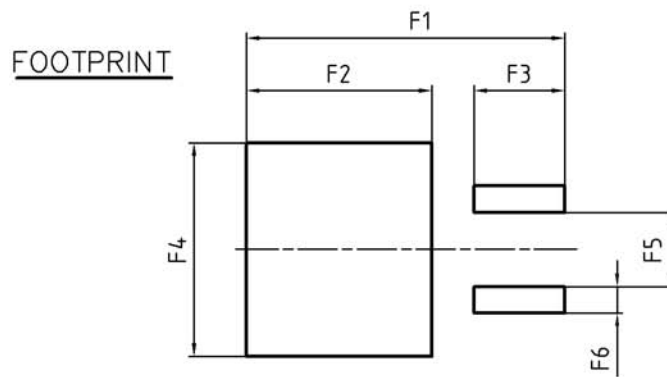
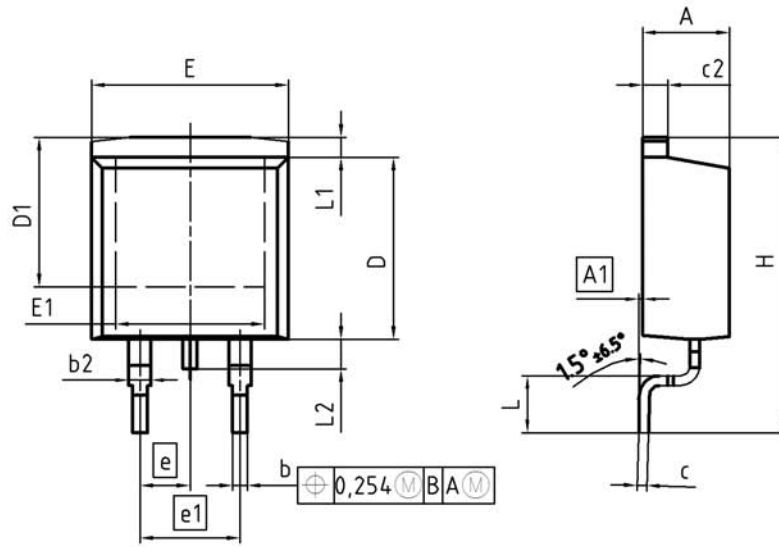


**9 Max. transient thermal impedance**

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

parameter :  $D = t_p/T$

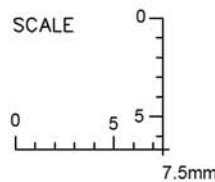




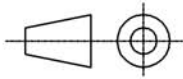
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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