

Fast Switching Emitter Controlled Diode

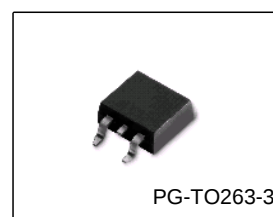


Feature

- 600V Emitter Controlled technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- 175°C operating temperature
- Easy paralleling
- Qualified according to JEDEC⁰⁾ for target applications

Product Summary

V_{RRM}	600	V
I_F	23	A
V_F	1.5	V
T_{jmax}	175	°C



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDB23E60	PG -TO263-3	-	D23E60	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 $T_C = 25\text{ °C}$ $T_C = 90\text{ °C}$	I_F	41 28	A
Surge non repetitive forward current $T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$, sine halfwave	I_{FSM}	89	A
Maximum repetitive forward current $T_C = 25\text{ °C}$, t_p limited by $t_{j,max}$, $D = 0.5$	I_{FRM}	65	A
Power dissipation $T_C = 25\text{ °C}$ $T_C = 90\text{ °C}$	P_{tot}	115 65	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	
Soldering temperature 1.6mm (0.063 in.) from case for 10 s	T_S	260	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	1.3	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	75	
@ 6 cm ² cooling area ¹⁾		-	-	50	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Reverse leakage current	I_{R}				μA
$V_{\text{R}}=600\text{V}$, $T_{\text{j}}=25^{\circ}\text{C}$		-	-	50	
$V_{\text{R}}=600\text{V}$, $T_{\text{j}}=150^{\circ}\text{C}$		-	-	1900	
Forward voltage drop	V_{F}				V
$I_{\text{F}}=23\text{A}$, $T_{\text{j}}=25^{\circ}\text{C}$		-	1.5	2	
$I_{\text{F}}=23\text{A}$, $T_{\text{j}}=150^{\circ}\text{C}$		-	1.5	-	

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.

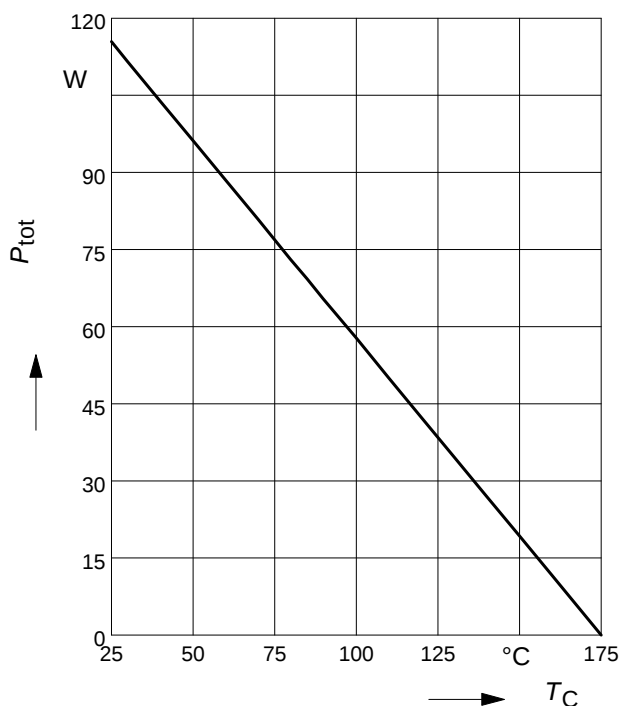
Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Reverse recovery time $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=25^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=125^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=150^{\circ}C$	t_{rr}	- - -	120 164 170	- - -	ns
Peak reverse current $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=25^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=125^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=150^{\circ}C$	I_{rrm}	- - -	17 19.5 21.5	- - -	A
Reverse recovery charge $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=25^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=125^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=150^{\circ}C$	Q_{rr}	- - -	970 1580 1770	- - -	nC
Reverse recovery softness factor $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=25^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=125^{\circ}C$ $V_R=400V, I_F=23A, di_F/dt=1000A/\mu s, T_j=150^{\circ}C$	S	- - -	4.4 4.8 5	- - -	

1 Power dissipation

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

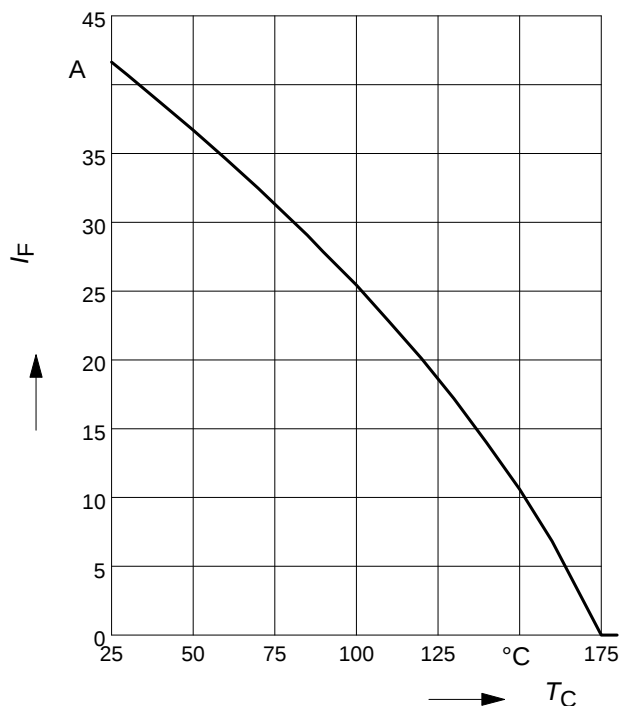
parameter: $T_j \leq 175^\circ\text{C}$



2 Diode forward current

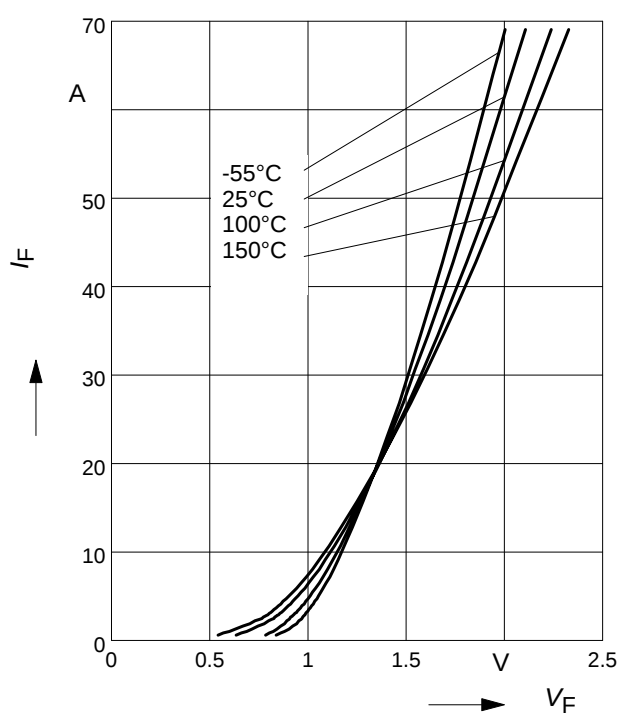
$$I_F = f(T_C)$$

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



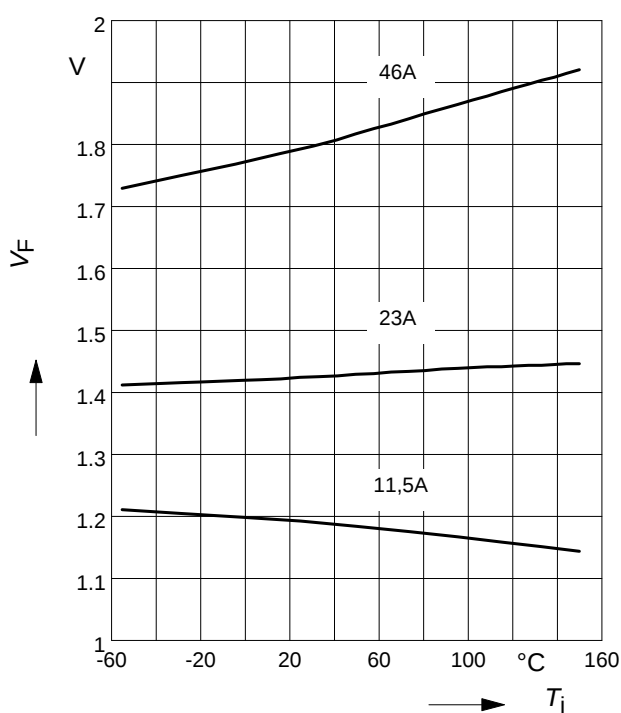
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

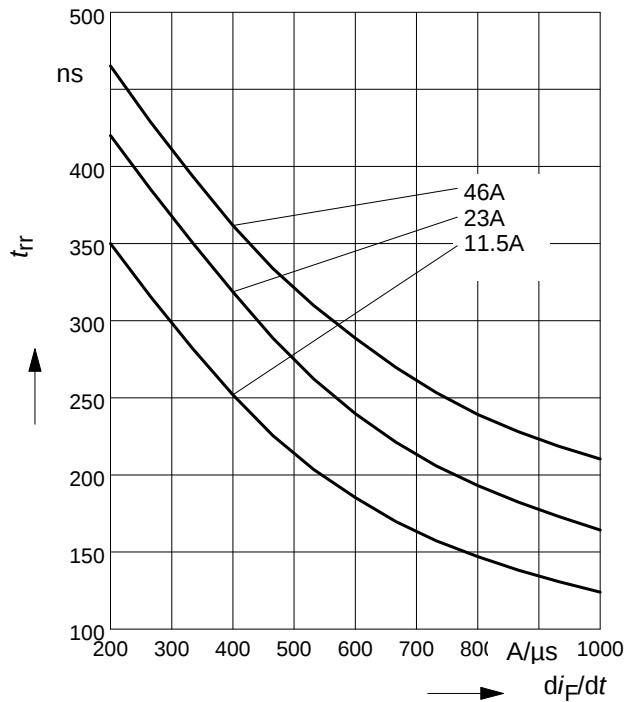
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

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

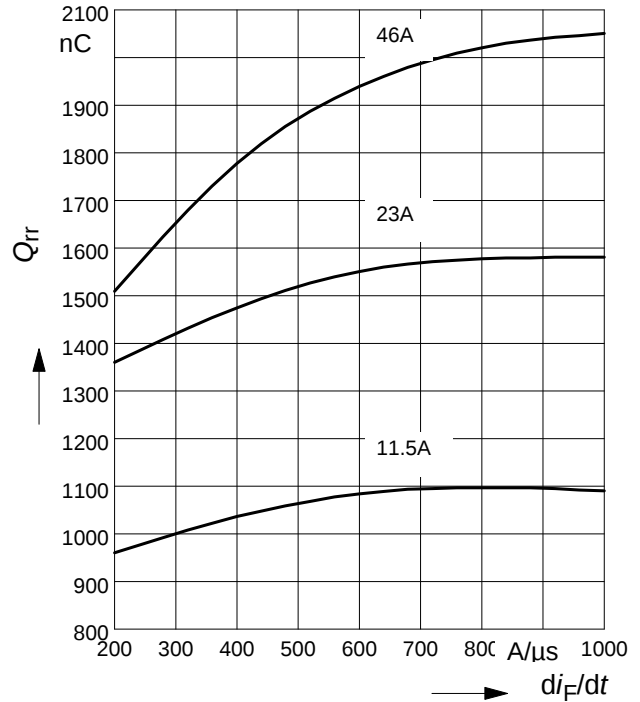
parameter: $V_R = 400V$, $T_j = 125^\circ C$



6 Typ. reverse recovery charge

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

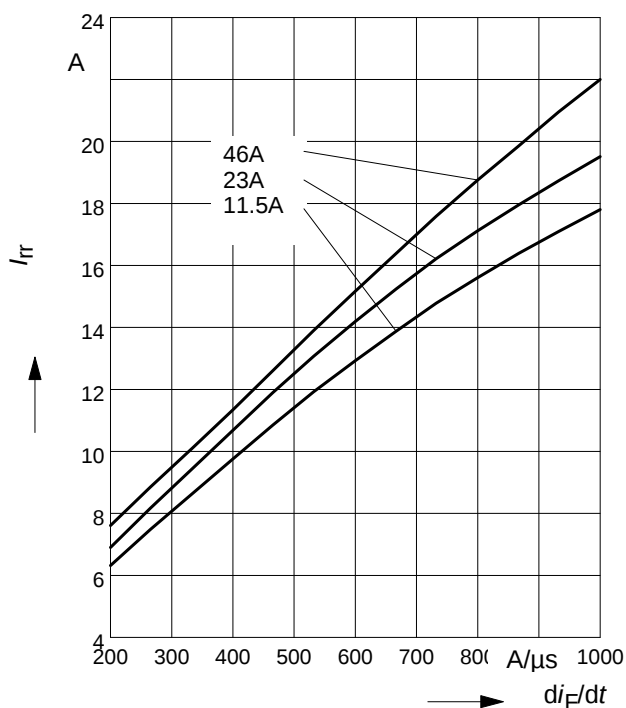
parameter: $V_R = 400V$, $T_j = 125^\circ C$



7 Typ. reverse recovery current

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

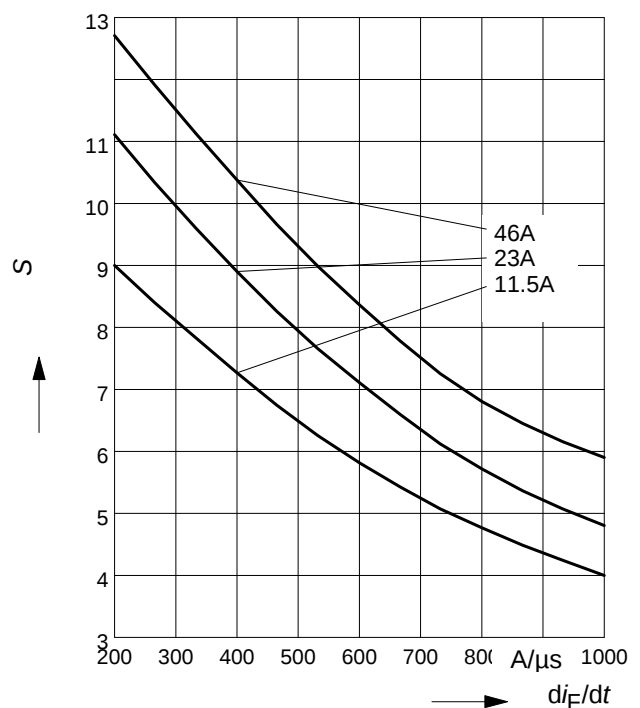
parameter: $V_R = 400V$, $T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

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

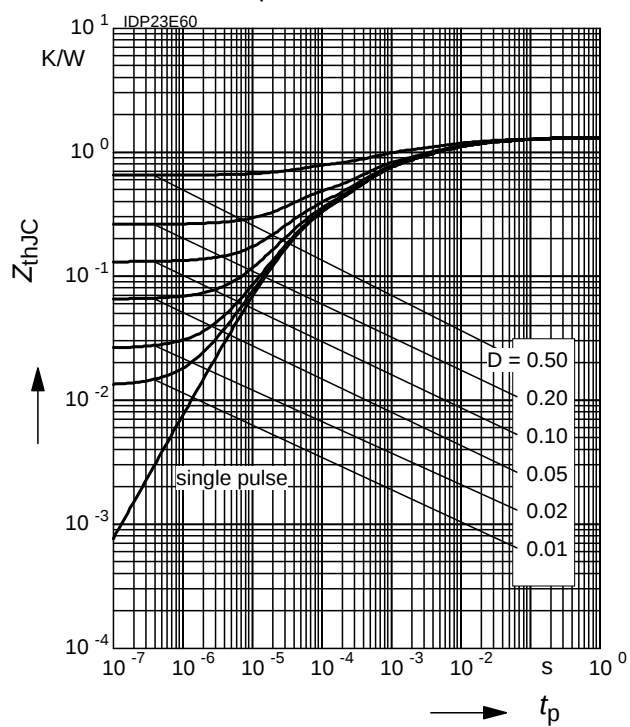
parameter: $V_R = 400V$, $T_j = 125^\circ C$

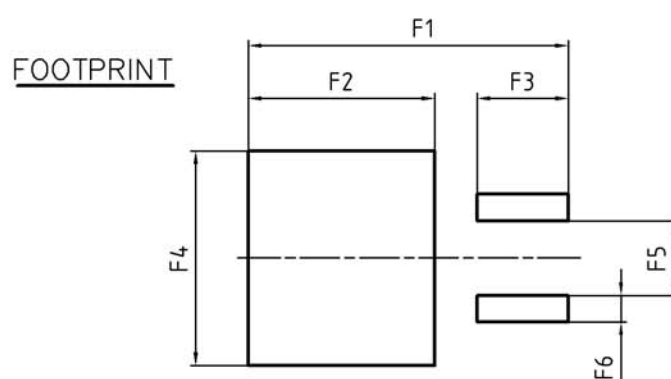
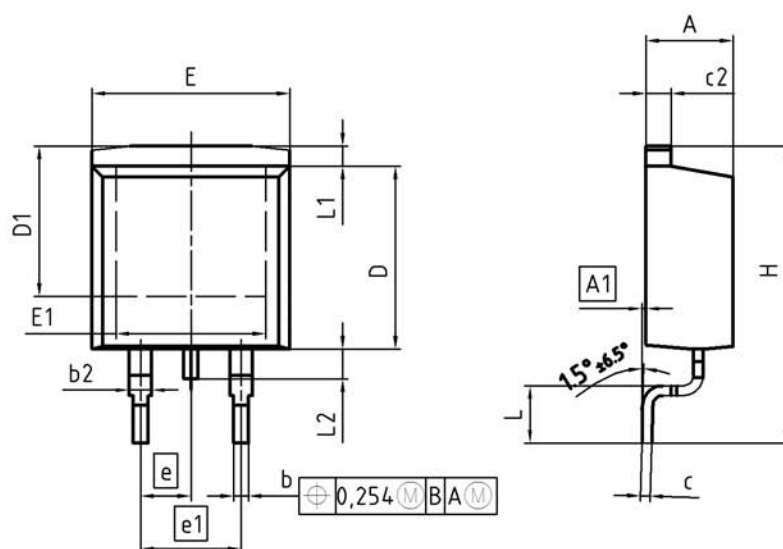


9 Max. transient thermal impedance

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

parameter : $D = t_p/T$





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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