

Low voltage fast-switching NPN power transistors

Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast-switching speed

Applications

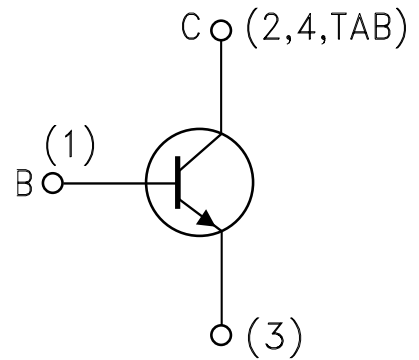
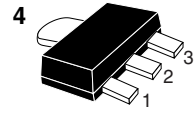
- Emergency lighting
- LED
- Voltage regulation
- Relay drive

Description

The devices are NPN transistors manufactured using new "PB-HDC" (power bipolar high density current) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage.

Marking : 1360

SOT-89



Absolute maximum ratings

Symbol	Parameter	Value			Unit
		2STD1360	2STF1360	2STN1360	
		DDAK	SOT-89	SOT-223	
V_{CBO}	Collector-base voltage ($I_E = 0$)	80			V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60			V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	6			V
I_C	Collector current	3			A
I_{CM}	Collector peak current ($t_P < 5$ ms)	5			A
I_B	Base current	0.2			A
I_{BM}	Base peak current ($t_P < 5$ ms)	0.4			A
P_{TOT}	Total dissipation at $T_{amb} = 25$ °C	15	1.4	1.6	W
T_{stg}	Storage temperature	-65 to 150			°C
T_J	Max. operating junction temperature	150			°C

Thermal data

Symbol	Parameter	DDAK	SOT-89	SOT-223	Unit
$R_{thJA}^{(1)}$	Thermal resistance junction-ambient Max	8.3	89	78	°C/W

1. Device mounted on a PCB area of 1 cm²

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$T_{CASE} = 25^{\circ}C$; unless otherwise specified.

Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_E = 0$)	$V_{CB} = 80\text{ V}$			100	nA
I_{EBO}	Emitter cut-off current ($I_C = 0$)	$V_{EB} = 6\text{ V}$			100	nA
$V_{BE(on)}$	Base-emitter on voltage	$V_{CE} = 2\text{ V}$ $I_C = 100\text{ mA}$	630	650	730	mV
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 2\text{ A}$ $I_B = 100\text{ mA}$ $I_C = 3\text{ A}$ $I_B = 150\text{ mA}$		130 180	300 500	mV
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 2\text{ A}$ $I_B = 100\text{ mA}$		0.9	1.2	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 100\text{ mA}$ $V_{CE} = 2\text{ V}$ $I_C = 1\text{ A}$ $V_{CE} = 2\text{ V}$	80 160		400	
t_d	Resistive load Delay time	$I_C = 3\text{ A}$ $V_{CC} = 10\text{ V}$ $I_{B(on)} = -I_{B(off)} = 300\text{ mA}$ $V_{BE(off)} = -5\text{ V}$		17	20	ns
t_r	Rise time			81	100	ns
t_s	Storage time			620	720	ns
t_f	Fall time			54	65	ns
f_T	Transition frequency	$I_C = 0.1\text{ A}$ $V_{CE} = 10\text{ V}$		130		MHz

1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

Figure 2. DC current gain ($V_{CE} = 5\text{ V}$)

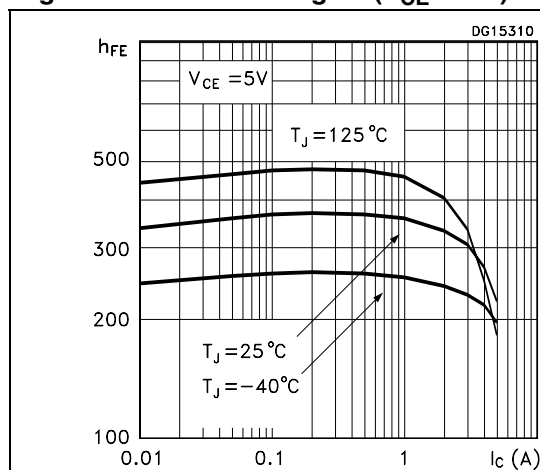
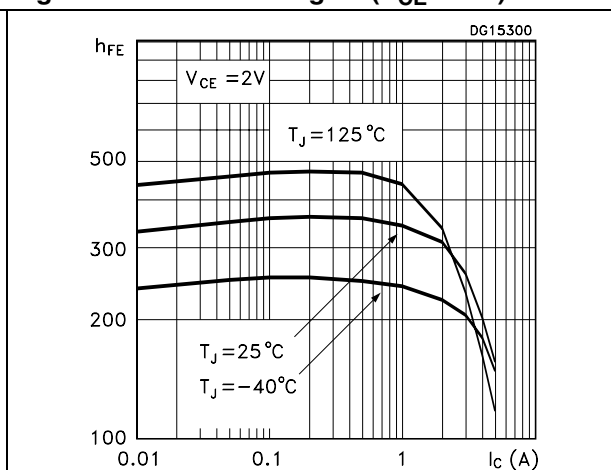


Figure 3. DC current gain ($V_{CE} = 2\text{ V}$)



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Figure 4. Collector emitter saturation voltage **Figure 5. Base emitter saturation voltage**

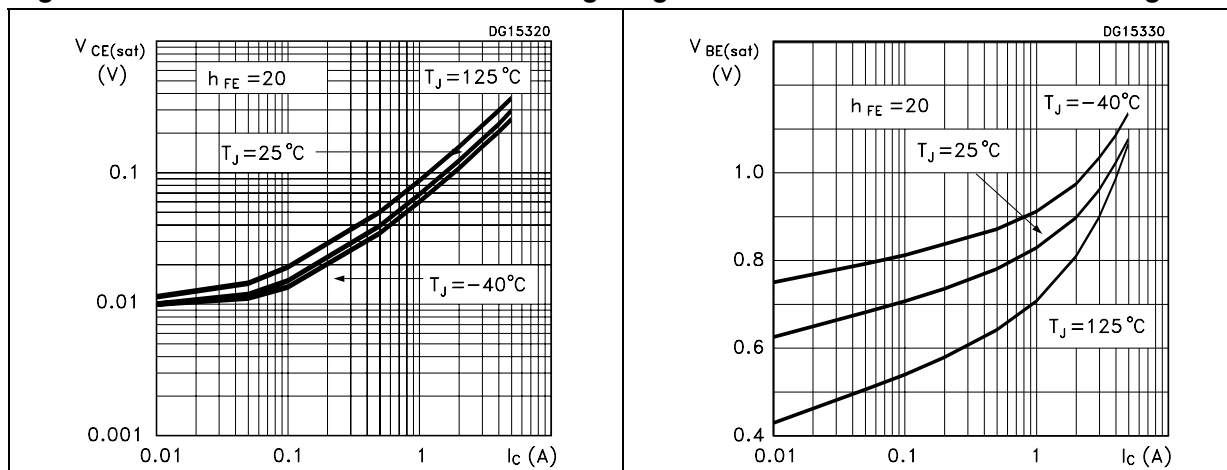


Figure 6. Resistive load switching on **Figure 7. Resistive load switching off**

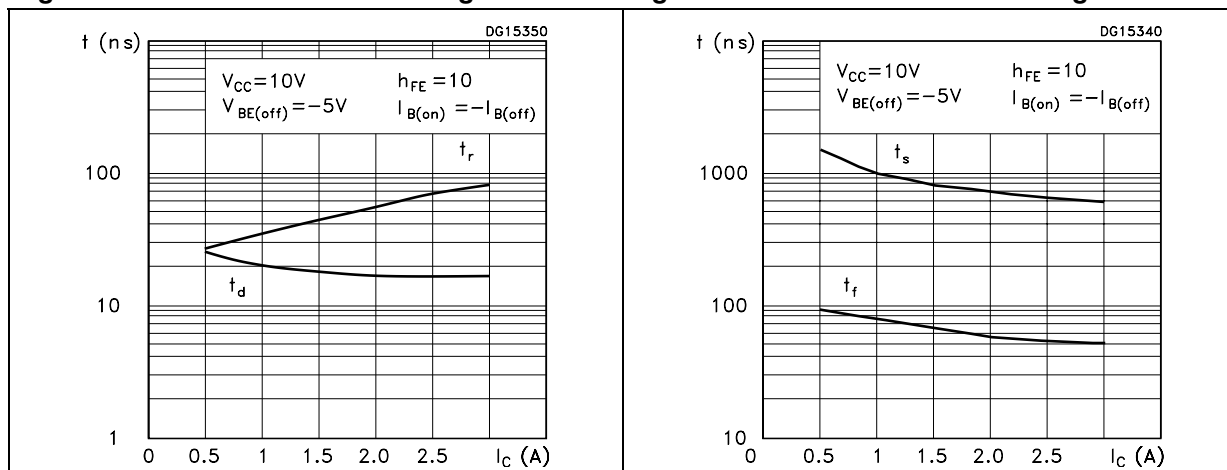
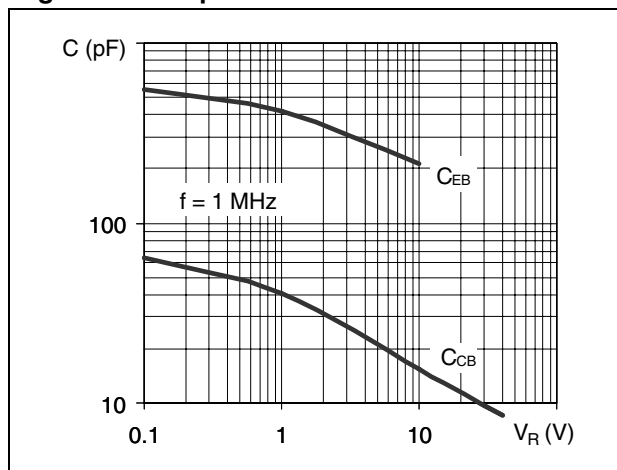
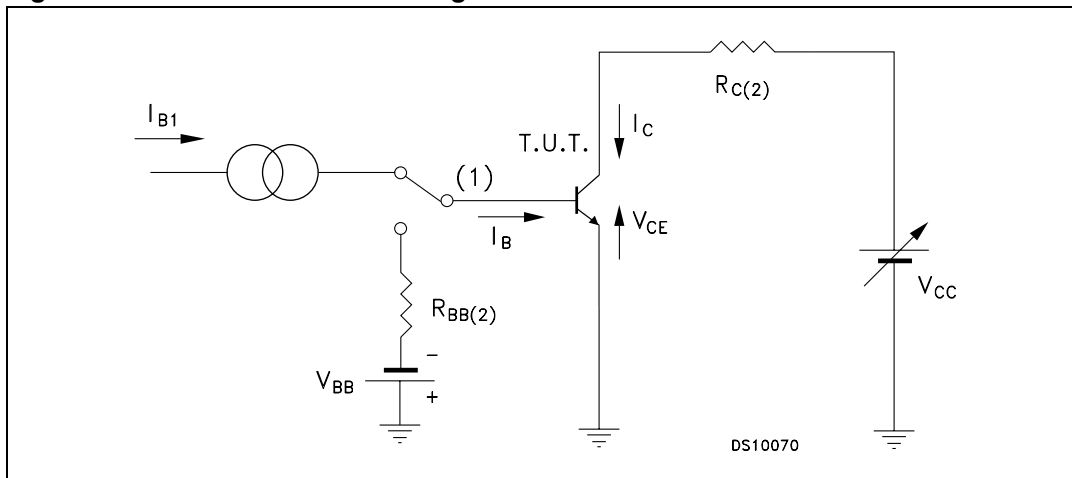


Figure 8. Capacitance



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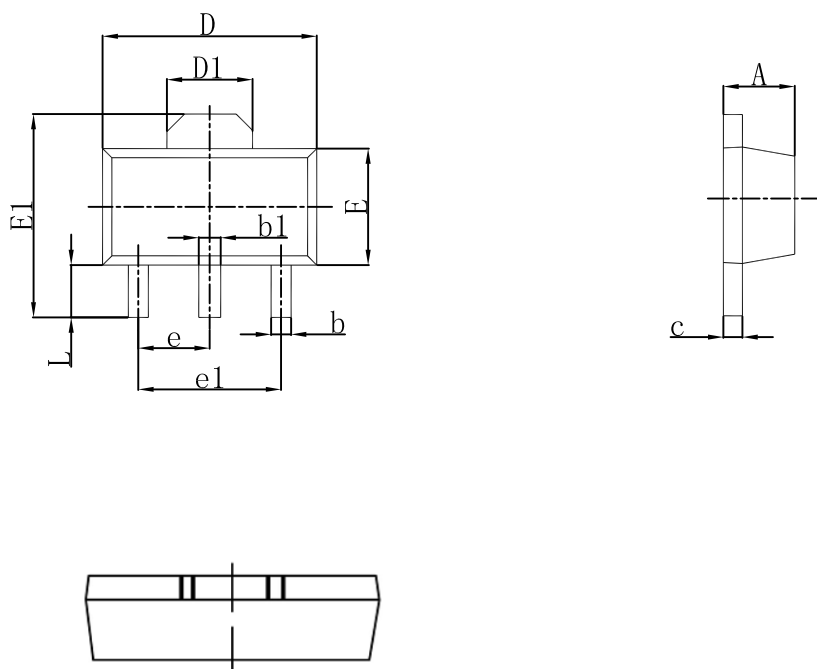
Figure 9. Resistive load switching



1. Fast electronic switch
2. Non-inductive resistor

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SOT-89 Outlines Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047