NSS30201MR6T1G

30 V, 3 A, Low $V_{CE(sat)}$ NPN Transistor

ON Semiconductor's e^{2}PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical application are DC−DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e^{2}PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

- This is a Pb−Free Device

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	30	V
Collector-Base Voltage	V_{CBO}	50	V
Emitter-Base Voltage	V_{EBO}	5.0	V
Collector Current − Continuous	I_C	2.0	A
Collector Current − Peak	I_{CM}	3.0	A

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 1)	535 4.3	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	234	°C/W
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 2)	1.180 9.4	W mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	106	°C/W
Thermal Resistance, Junction−to−Lead #1	$R_{\theta JL}$ (Note 1) $R_{\theta JL}$ (Note 2)	110 50	°C/W °C/W
Total Device Dissipation (Single Pulse < 10 s)	$P_{Dsingle}$ (Notes 2 and 3)	1.75	W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. FR−4 with 1 oz and 3.9 mm^2 of copper area.
2. FR−4 with 1 oz and 645 mm^2 of copper area.
3. Refer to Figure 8.

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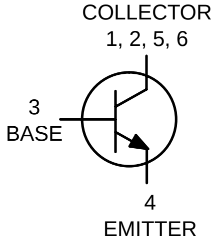
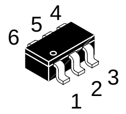
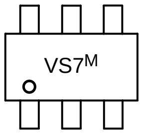
30 VOLTS
3.0 AMPS
NPN LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 100 mΩ





TSOP−6
CASE 318G
STYLE 6

DEVICE MARKING



VS7 = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NSS30201MR6T1G	TSOP−6 (Pb−Free)	3000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

June, 2005 − Rev. 0

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (I_C = 10 mA, I_B = 0)	$V_{(BR)CEO}$	30	−	−	V
Collector−Base Breakdown Voltage (I_C = 0.1 mA, I_E = 0)	$V_{(BR)CBO}$	50	−	−	V
Emitter−Base Breakdown Voltage (I_E = 0.1 mA, I_C = 0)	$V_{(BR)EBO}$	5.0	−	−	V
Collector Cutoff Current (V_{CB} = 30 V, I_E = 0)	I_{CBO}	−	−	0.1	μA
Collector−Emitter Cutoff Current (V_{CES} = 30 V)	I_{CES}	−	−	0.1	μA
Emitter Cutoff Current (V_{EB} = 4.0 V)	I_{EBO}	−		0.1	μA
ON CHARACTERISTICS					
DC Current Gain (Note 4) (I_C = 1.0 mA, V_{CE} = 5.0 V) (I_C = 0.5 A, V_{CE} = 5.0 V) (I_C = 1.0 A, V_{CE} = 5.0 V)	h_{FE}	 300 300 200	 − 500 −	 − 900 −	
Collector−Emitter Saturation Voltage (Note 4) (I_C = 1.0 A, I_B = 100 mA) (I_C = 0.5 A, I_B = 50 mA) (I_C = 0.1 A, I_B = 1.0 mA)	$V_{CE(sat)}$	 − − −	 0.10 0.06 0.05	 0.200 0.125 0.075	V
Base−Emitter Saturation Voltage (Note 4) (I_C = 1.0 A, I_B = 0.1 A)	$V_{BE(sat)}$	−	−	1.1	V
Base−Emitter Turn−on Voltage (Note 4) (I_C = 1.0 A, V_{CE} = 2.0 V)	$V_{BE(on)}$	−	−	1.1	V
Cutoff Frequency (I_C = 100 mA, V_{CE} = 5.0 V, f = 100 MHz	f_T	200	300	−	MHz
Output Capacitance (f = 1.0 MHz)	C_{obo}	−	−	15	pF

4. Pulsed Condition: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

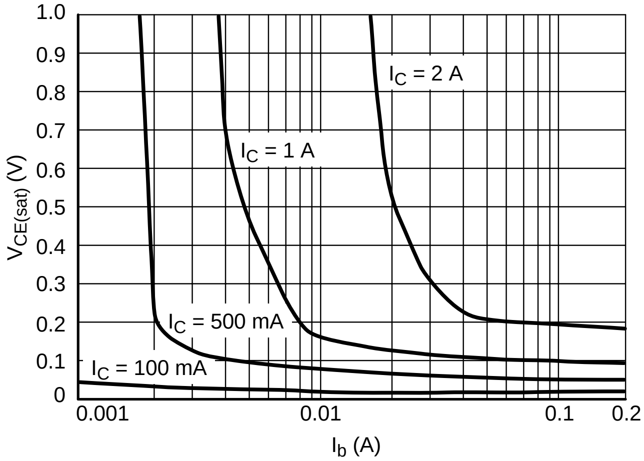


Figure 1. $V_{CE\,(sat)}$ versus I_b

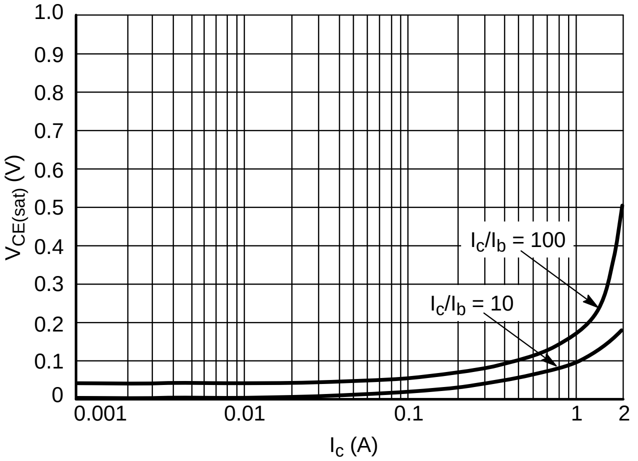


Figure 2. $V_{CE\,(sat)}$ versus I_c

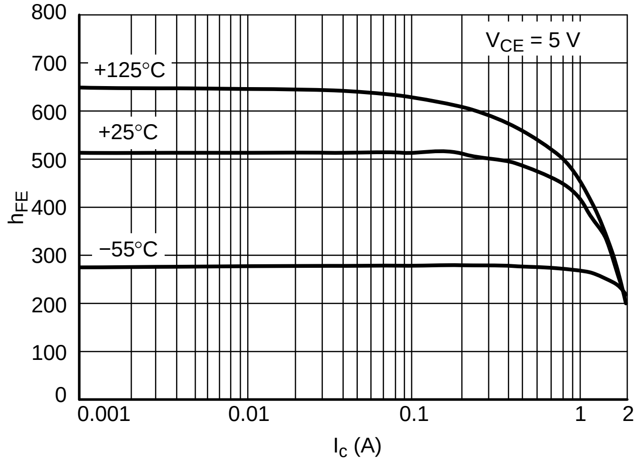


Figure 3. h_{FE} versus I_c

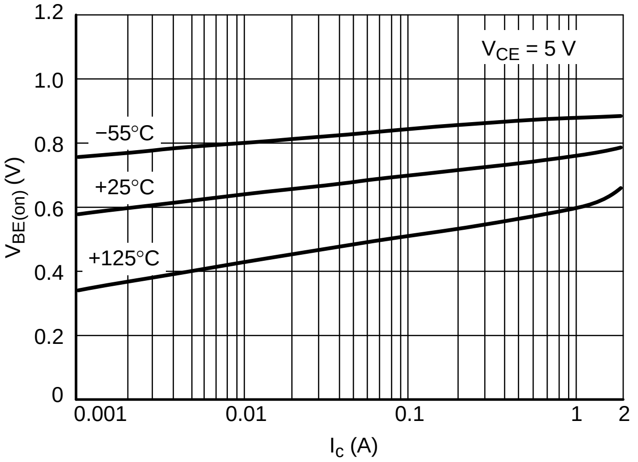


Figure 4. $V_{BE(on)}$ versus I_c

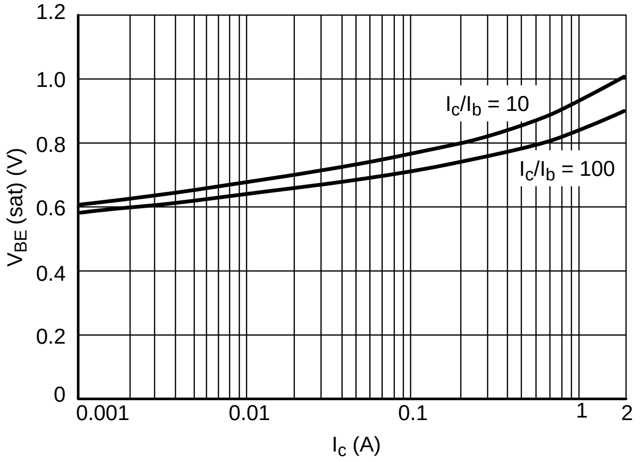


Figure 5. $V_{BE(sat)}$ versus I_c

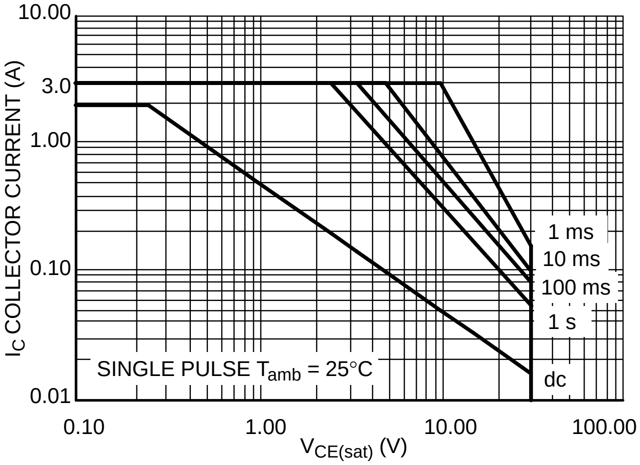


Figure 6. Safe Operating Area

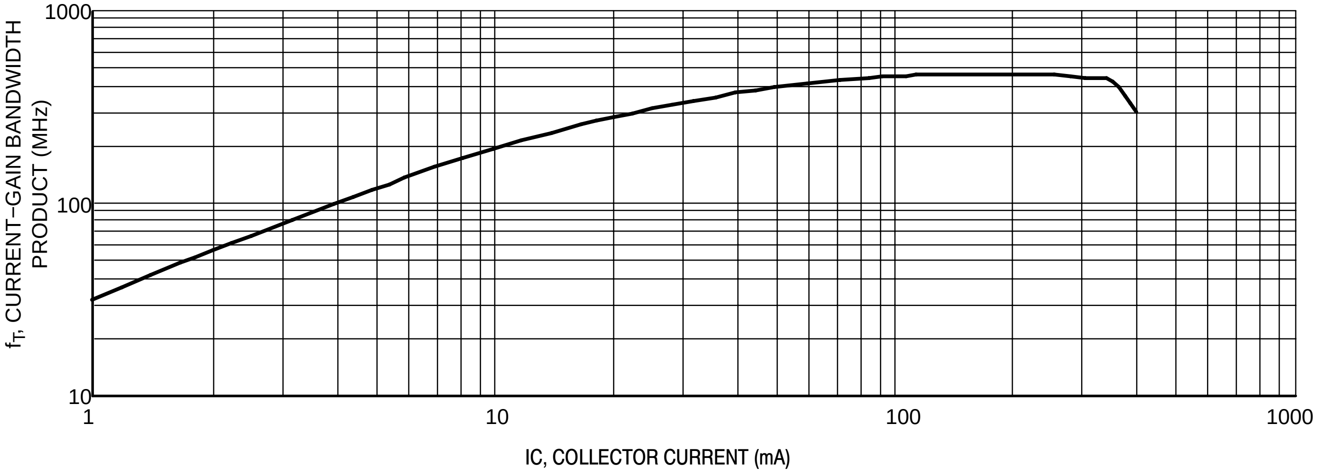


Figure 7. f$_T$ (MHZ) versus I$_C$ (mA)
V$_{CE}$ = 5.0 V

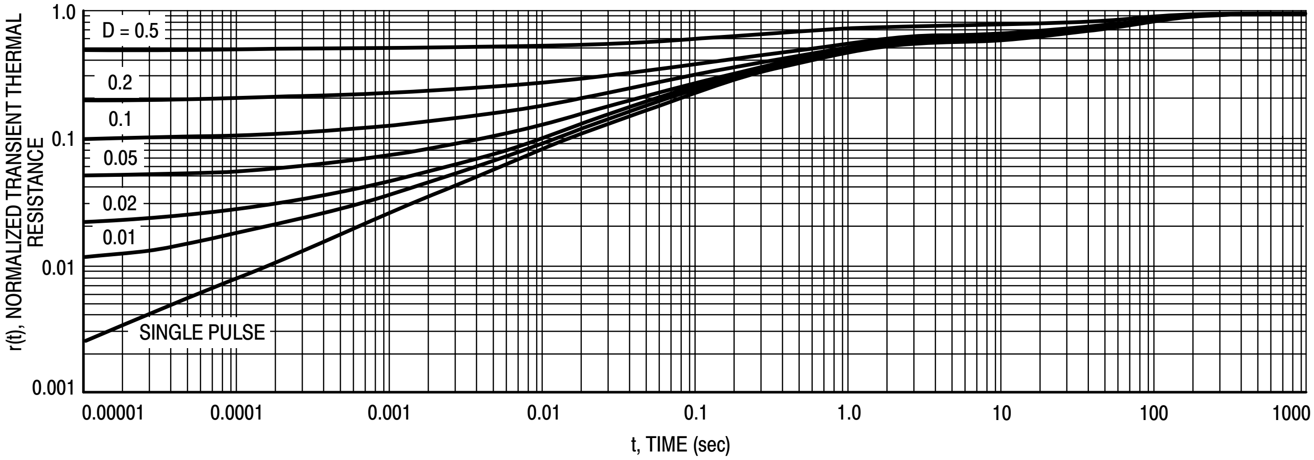
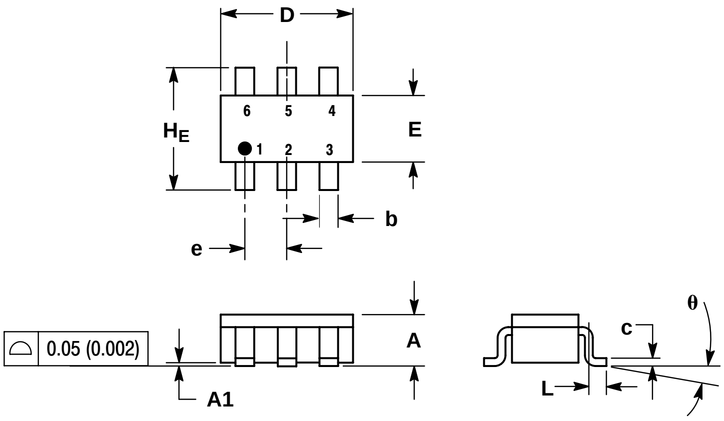


Figure 8. Normalized Thermal Response

PACKAGE DIMENSIONS

TSOP−6

CASE 318G−02
ISSUE P

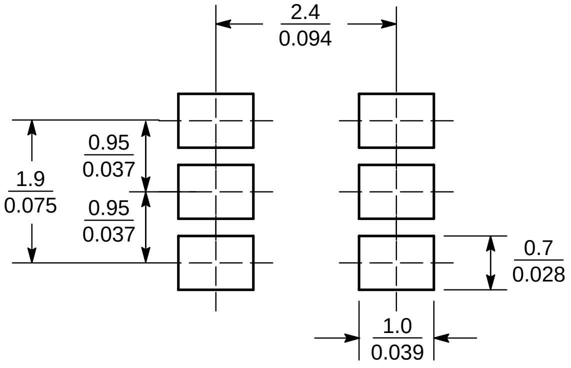


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	**MIN**	**NOM**	**MAX**	**MIN**	**NOM**	**MAX**
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.38	0.50	0.010	0.014	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
H_E	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	−	10°	0°	−	10°

STYLE 6:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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