NSS20300MR6T1G

20 V, 5 A, Low $V_{CE(sat)}$ PNP Transistor

ON Semiconductor's e^2PowerEdge 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^2PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	−20	Vdc
Collector-Base Voltage	V_{CBO}	−30	Vdc
Emitter-Base Voltage	V_{EBO}	−6.0	Vdc
Collector Current − Continuous	I_C	−3.0	Adc
Collector Current − Peak	I_{CM}	−5.0	A
Electrostatic Discharge	ESD	HBM Class 3B MM Class C	

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation, T_A = 25°C Derate above 25°C	P_D (Note 1)	545 4.3	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	230	°C/W
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 2)	106 8.5	W mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	118	°C/W
Thermal Resistance, Junction−to−Lead #1	$R_{\theta JL}$ (Note 1) $R_{\theta JL}$ (Note 2)	48 40	°C/W °C/W
Total Device Dissipation (Single Pulse < 10 sec.)	$P_{Dsingle}$ (Note 2)	1.75	W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

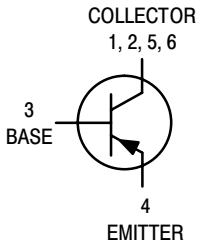
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR−4 @ 100 mm^2, 2 oz copper traces.
2. FR−4 @ 500 mm^2, 2 oz copper traces.

ON Semiconductor

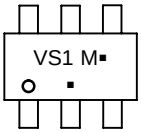
http://onsemi.com

20 VOLTS
5.0 AMPS
PNP LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 78 mΩ



TSOP−6
CASE 318G
STYLE 6

DEVICE MARKING



VS1 = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NSS20300MR6T1G	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.

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

Characteristic	Symbol	Min	Typical	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (I_C = −10 mAdc, I_B = 0)	$V_{(BR)CEO}$	−20		−	Vdc
Collector−Base Breakdown Voltage (I_C = −0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	−30		−	Vdc
Emitter−Base Breakdown Voltage (I_E = −0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	−6.0		−	Vdc
Collector Cutoff Current (V_{CB} = −20 Vdc, I_E = 0)	I_{CBO}	−		−0.1	μAdc
Collector−Emitter Cutoff Current (V_{CES} = −20 Vdc)	I_{CES}	−		−0.1	μAdc
Emitter Cutoff Current (V_{EB} = −6.0 Vdc)	I_{EBO}	−		−0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (1) (I_C = −1.0 A, V_{CE} = −1.5 V) (I_C = −1.5 A, V_{CE} = −2.0 V) (I_C = −2.0 A, V_{CE} = −2.0 V)	h_{FE}	 100 100 100	 230 	 − 400 −	
Collector−Emitter Saturation Voltage (Note 3) (I_C = −0.10 A, I_B = −0.010 A) (I_C = −1.0 A, I_B = −0.010 A) (I_C = −2.0 A, I_B = −0.02 A)	$V_{CE(sat)}$	 − − −	 −0.010 −0.127 −0.250	 −0.015 −0.145 −0.320	V
Base−Emitter Saturation Voltage (Note 3) (I_C = −1A, I_B = −0.010 A)	$V_{BE(sat)}$	−	−	−0.85	V
Base−Emitter Turn−on Voltage (Note 3) (I_C = −2.0 A, V_{CE} = −3.0 V)	$V_{BE(on)}$	−	−	−0.875	V
Cutoff Frequency (I_C = −100 mA, V_{CE} = −5.0 V, f = 100 MHz)	f_T	100	−	−	MHz
Input Capacitance (V_{EB} = −0.5 V, f = 1.0 MHz)	C_{IBO}	−		650	pF
Output Capacitance (V_{CB} = −3.0 V, f = 1.0 MHz)	C_{OBO}	−		100	pF

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

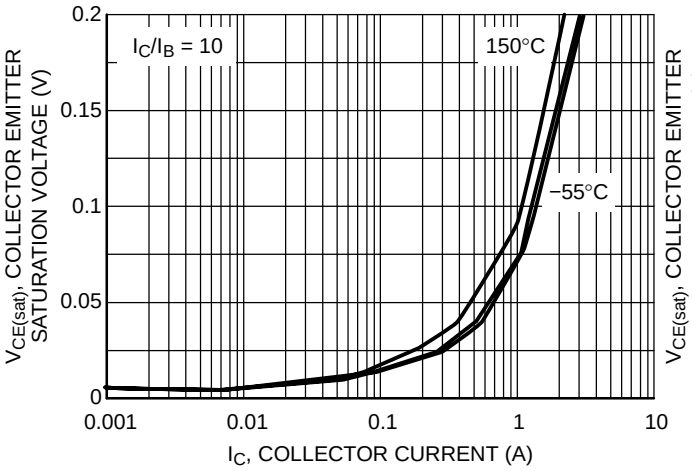


Figure 1. Collector Emitter Saturation Voltage versus Collector Current

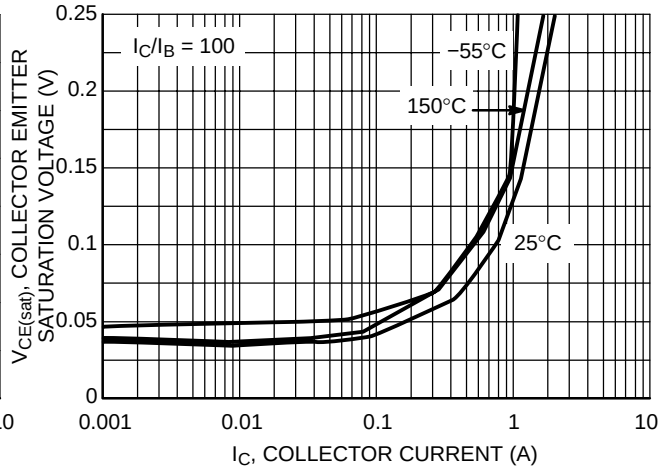


Figure 2. Collector Emitter Saturation Voltage versus Collector Current

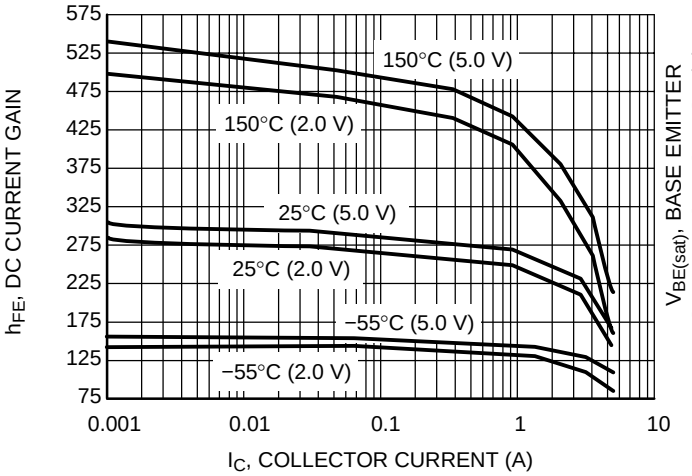


Figure 3. DC Current Gain versus Collector Current

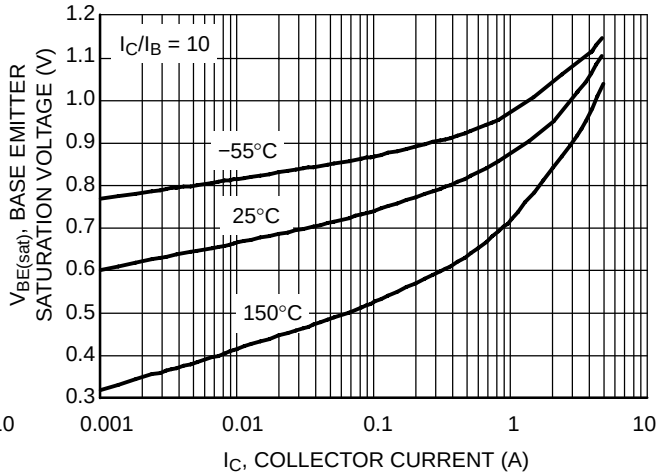


Figure 4. Base Emitter Saturation Voltage versus Collector Current

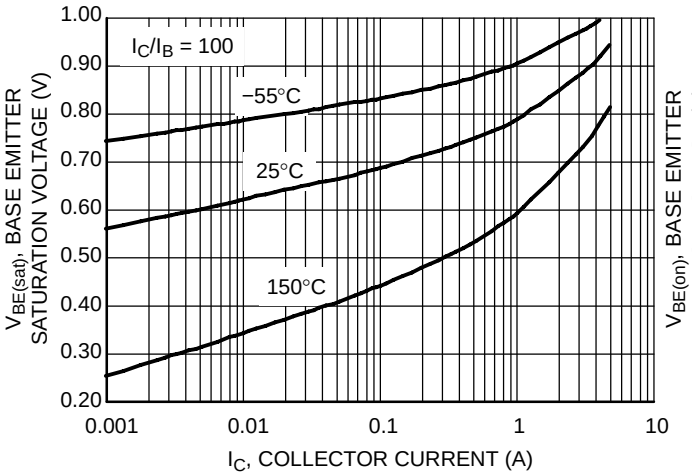


Figure 5. Base Emitter Saturation Voltage versus Collector Current

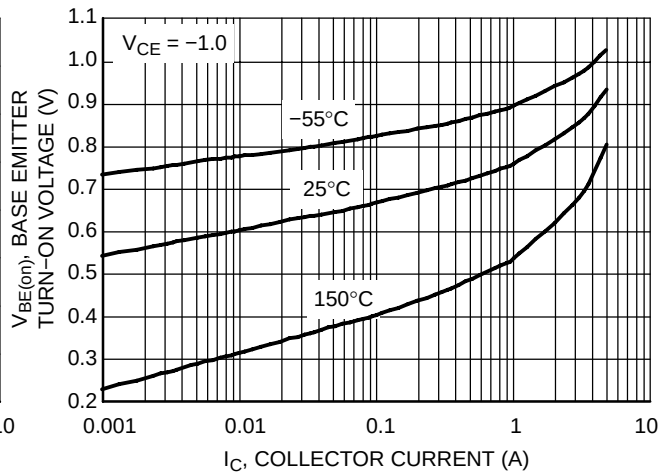


Figure 6. Base Emitter Turn−On Voltage versus Collector Current

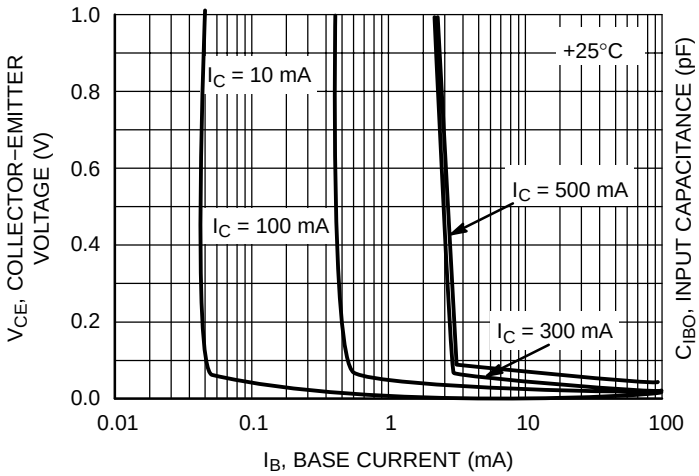


Figure 7. Saturation Region

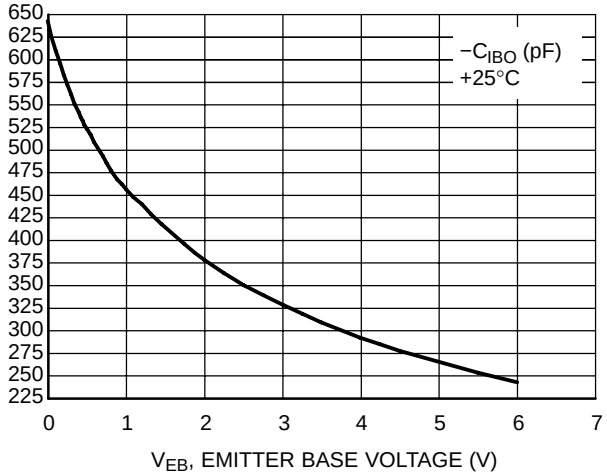


Figure 8. NSS20300MR6T1G Input Capacitance

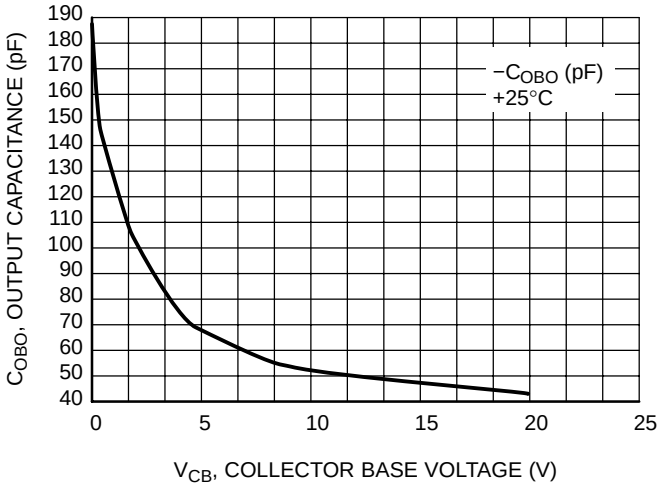
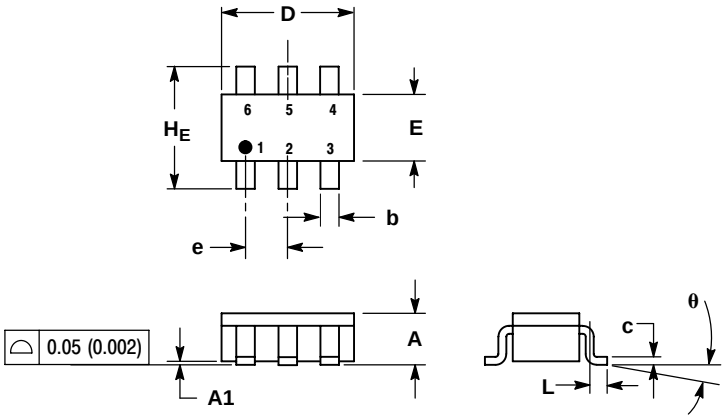


Figure 9. NSS20300MR6T1G Output Capacitance

NSS20300MR6T1G

PACKAGE DIMENSIONS

TSOP−6
CASE 318G−02
ISSUE S

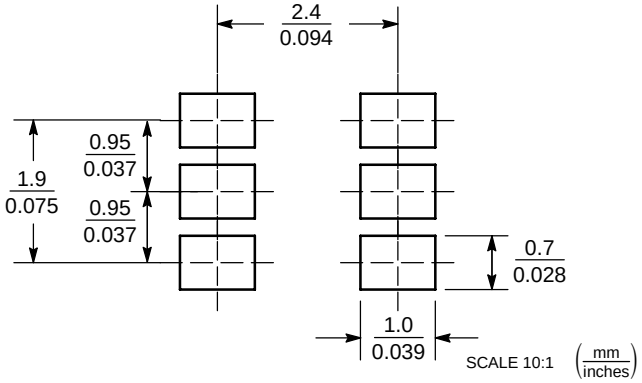


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	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*



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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5773−3850

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative