

# NSS12200WT1G

## 12 V, 3 A, Low $V_{CE(sat)}$ PNP Transistor

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

### Features

- High Current Capability (3 A)
- High Power Handling (Up to 650 mW)
- Low  $V_{CE(s)}$  (170 mV Typical @ 1 A)
- Small Size
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Benefits

- High Specific Current and Power Capability Reduces Required PCB Area
- Reduced Parasitic Losses Increases Battery Life

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	$V_{CEO}$	-12	Vdc
Collector-Base Voltage	$V_{CBO}$	-12	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current – Continuous	$I_C$	-2.0	Adc
– Peak	$I_{CM}$	-3.0	
Electrostatic Discharge	ESD	HBM Class 3 MM Class C	

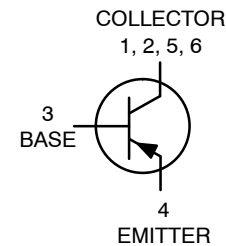
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



**ON Semiconductor**®

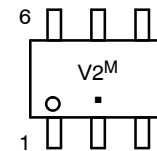
<http://onsemi.com>

**12 VOLTS**  
**3.0 AMPS**  
**PNP LOW  $V_{CE(sat)}$  TRANSISTOR**  
**EQUIVALENT  $R_{DS(on)}$  163 m $\Omega$**



**SC-88/SOT-363**  
**CASE 419B**  
**STYLE 20**

### DEVICE MARKING



V2 = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping†
NSS12200WT1G	SOT-363 (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.

# NSS12200WT1G

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 1)	450	mW
		3.6	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 1)	275	$^\circ\text{C}/\text{W}$
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 2)	650	mW
		5.2	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 2)	192	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Lead 6	$R_{\theta JL}$	105	$^\circ\text{C}/\text{W}$
Total Device Dissipation (Single Pulse < 10 sec.)	$P_D$ Single	1.4	W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

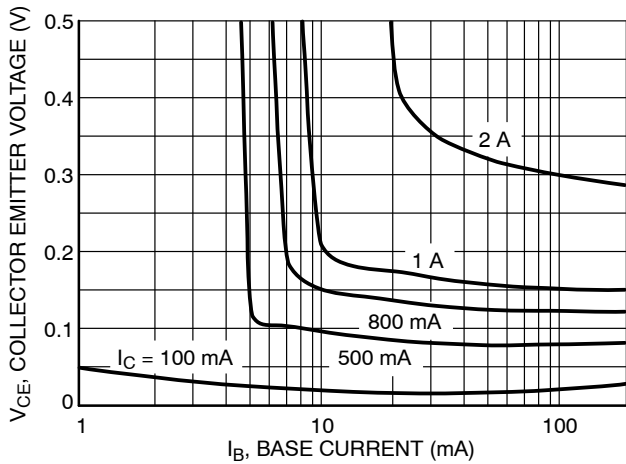
Collector-Emitter Breakdown Voltage, ( $I_C = -10$ mAdc, $I_B = 0$ )	$V_{(BR)CEO}$	-12	-15	-	Vdc
Collector-Base Breakdown Voltage, ( $I_C = -0.1$ mAdc, $I_E = 0$ )	$V_{(BR)CBO}$	-12	-25	-	Vdc
Emitter-Base Breakdown Voltage, ( $I_E = -0.1$ mAdc, $I_C = 0$ )	$V_{(BR)EBO}$	-5.0	-7.0	-	Vdc
Collector Cutoff Current, ( $V_{CB} = -12$ Vdc, $I_E = 0$ )	$I_{CBO}$	-	-0.02	-0.1	$\mu\text{Adc}$
Collector-Emitter Cutoff Current, ( $V_{CES} = -12$ Vdc, $I_E = 0$ )	$I_{CES}$	-	-0.03	-0.1	$\mu\text{Adc}$
Emitter Cutoff Current, ( $V_{CES} = -5.0$ Vdc, $I_E = 0$ )	$I_{EBO}$	-	-0.03	-0.1	$\mu\text{Adc}$

### ON CHARACTERISTICS

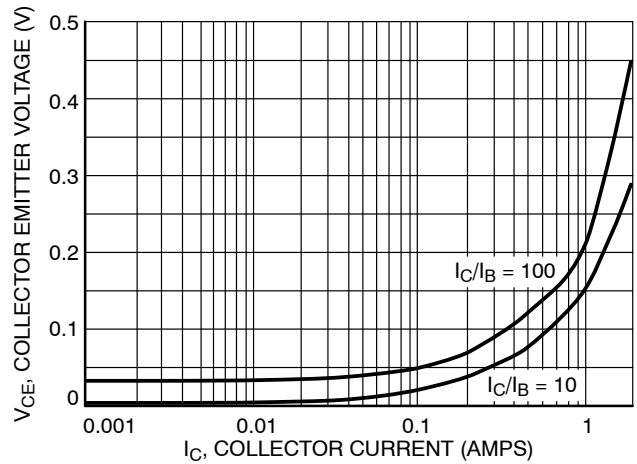
DC Current Gain (Note 3) ( $I_C = -0.5$ A, $V_{CE} = -1.5$ V) ( $I_C = -0.8$ A, $V_{CE} = -1.5$ V) ( $I_C = -1.0$ A, $V_{CE} = -1.5$ V)	$h_{FE}$	100 100 100	180 165 160	- 300 -	
Collector-Emitter Saturation Voltage (Note 3) ( $I_C = -0.5$ A, $I_B = -10$ mA) ( $I_C = -0.8$ A, $I_B = -16$ mA) ( $I_C = -1.0$ A, $I_B = -20$ mA)	$V_{CE(sat)}$	- - -	-0.10 -0.14 -0.17	-0.160 -0.235 -0.290	V
Base-Emitter Saturation Voltage (Note 3) ( $I_C = -1.0$ A, $I_B = -20$ mA)	$V_{BE(sat)}$	-	-0.84	-0.95	V
Base-Emitter Turn-on Voltage (Note 3) ( $I_C = -1.0$ A, $V_{CE} = -1.5$ V)	$V_{BE(on)}$	-	-0.81	-0.95	V
Cutoff Frequency ( $I_C = -100$ mA, $V_{CE} = -5.0$ V, $f = 100$ MHz)	$f_T$	-	100	-	MHz
Output Capacitance ( $V_{CB} = -1.5$ V, $f = 1.0$ MHz)	$C_{obo}$	-	50	65	pF

- FR-4, Minimum Pad, 1 oz Coverage.
- FR-4, 1" Pad, 1 oz Coverage.
- Pulsed Condition: Pulse Width < 300  $\mu\text{sec}$ , Duty Cycle < 2%.

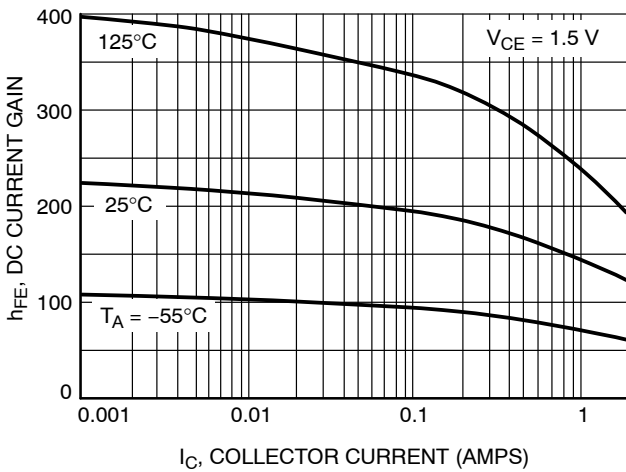
# NSS12200WT1G



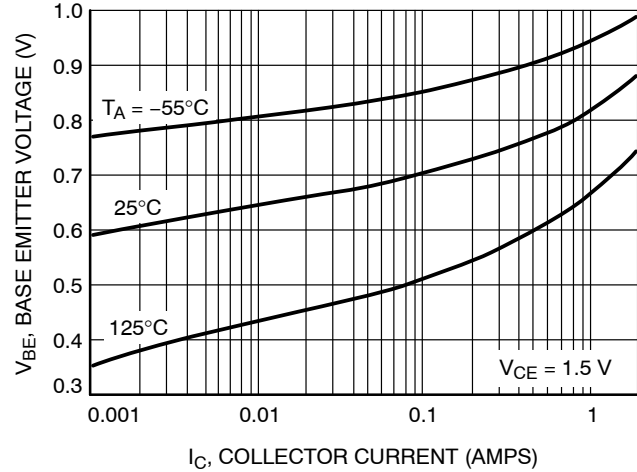
**Figure 1. Collector Emitter Voltage vs. Base Current**



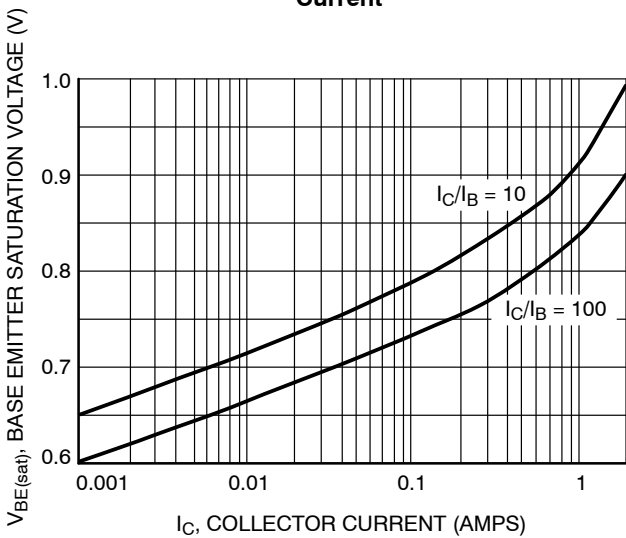
**Figure 2. Collector Emitter Voltage vs. Collector Current**



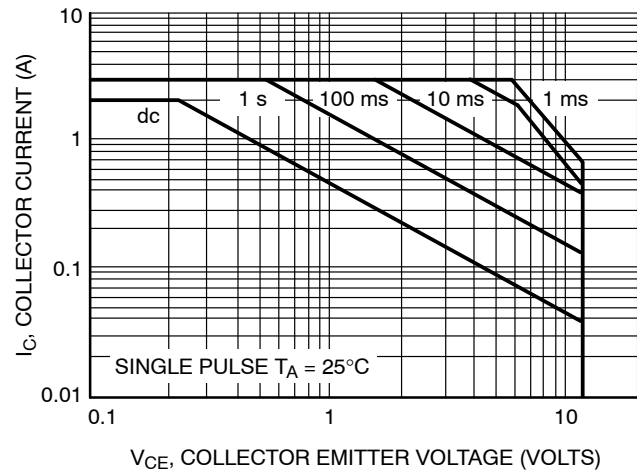
**Figure 3. DC Current Gain vs. Collector Current**



**Figure 4. Base Emitter Voltage vs. Collector Current**



**Figure 5. Base Emitter Saturation Voltage vs. Base Current**



**Figure 6. Safe Operating Area**

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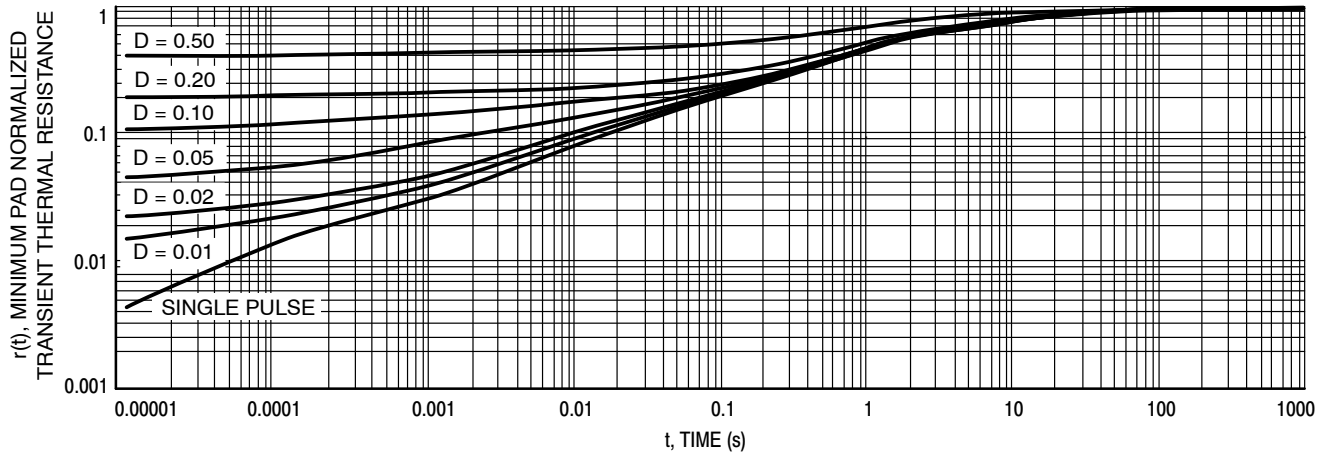


Figure 7. Normalized Thermal Response

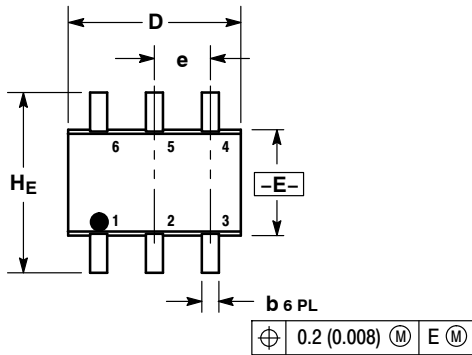
# NSS12200WT1G

## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W

NOTES:

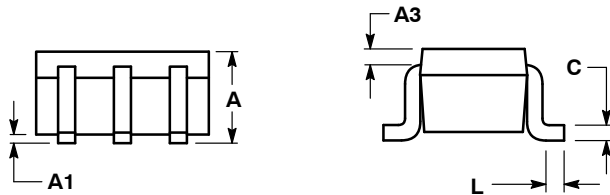
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.



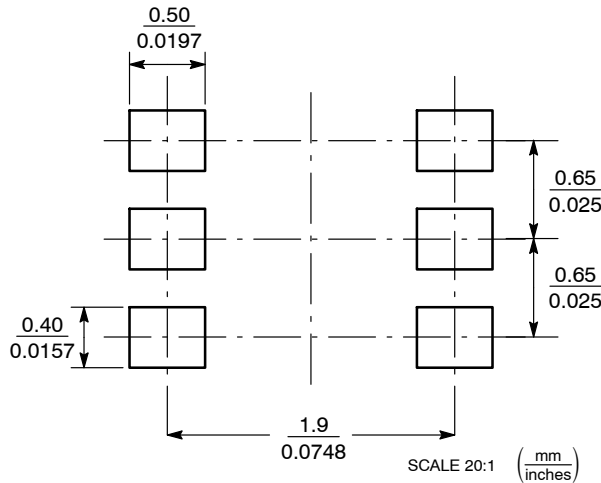
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	2.00	2.10	2.20	0.078	0.082	0.086

STYLE 20:

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.

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