

## NPN Transistor, 100 V, 3.0 A, Low V<sub>CE(sat)</sub> NSS1C301ET4G

**onsemi**'s  $e^2$ PowerEdge family of low  $V_{CE(sat)}$  transistors are 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 applications 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**

- Complement to NSS1C300ET4G
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

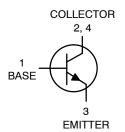
#### **MAXIMUM RATINGS** $(T_A = 25^{\circ}C)$

Rating	Symbol	Max	Unit
Collector-Base Voltage	$V_{CBO}$	140	Vdc
Collector-Emitter Voltage	$V_{CEO}$	100	Vdc
Emitter-Base Voltage	$V_{EB}$	6.0	Vdc
Collector Current - Continuous	Ic	3.0	Adc
Collector Current - Peak	I <sub>CM</sub>	6.0	Adc
Base Current	Ι <sub>Β</sub>	0.5	Adc
Total Power Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	33 0.26	W W/°C
Total Power Dissipation (Note 1) @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	2.1 0.017	W W/°C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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# 100 VOLTS, 3.0 AMPS 12.5 WATTS NPN LOW $V_{CE(sat)}$ TRANSISTOR





DPAK CASE 369C STYLE 1

#### **MARKING DIAGRAM**



Y = Year WW = Work Week 1C31E = Device Code G = Pb-Free

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NSS1C301ET4G	DPAK (Pb-Free)	2500/ Tape & Reel
NSV1C301ET4G	DPAK (Pb-Free)	2500/ Tape & Reel

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

These ratings are applicable when surface mounted on the minimum pad sizes recommended.

### NSS1C301ET4G

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{ heta JC}$	3.8	°C/W
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	59.5	°C/W

<sup>2.</sup> These ratings are applicable when surface mounted on the minimum pad sizes recommended.

#### **ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS			•		•
Collector – Emitter Breakdown Voltage ( $I_C = 10 \text{ mA}, I_B = 0$ )	V <sub>(BR)CEO</sub>	100	-	_	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = 0.1 mA, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	140	-	-	V
Emitter – Base Breakdown Voltage (I <sub>E</sub> = 0.1 mA, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	6.0	-	-	V
Collector Cutoff Current (V <sub>CB</sub> = 140 V, I <sub>E</sub> = 0)	Ісво	_	-	0.1	μΑ
Emitter Cutoff Current (V <sub>EB</sub> = 6.0 V)	I <sub>EBO</sub>	_	-	0.1	μΑ
ON CHARACTERISTICS	<u> </u>				
DC Current Gain (Note 3) $ \begin{aligned} &(I_C = 0.1 \text{ A, V}_{CE} = 2.0 \text{ V}) \\ &(I_C = 0.5 \text{ A, V}_{CE} = 2.0 \text{ V}) \\ &(I_C = 1.0 \text{ A, V}_{CE} = 2.0 \text{ V}) \\ &(I_C = 3.0 \text{ A, V}_{CE} = 2.0 \text{ V}) \end{aligned} $	h <sub>FE</sub>	200 200 120 80	- - - -	- - 360 -	-
Collector – Emitter Saturation Voltage (Note 3) ( $I_C = 0.1 \text{ A}, I_B = 10 \text{ mA}$ ) ( $I_C = 1.0 \text{ A}, I_B = 0.100 \text{ A}$ ) ( $I_C = 2.0 \text{ A}, I_B = 0.200 \text{ A}$ ) ( $I_C = 3.0 \text{ A}, I_B = 0.300 \text{ A}$ )	V <sub>CE(sat)</sub>	- - - -	0.015 0.045 0.080 0.115	0.050 0.090 0.150 0.250	V
Base – Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 0.1 A)	V <sub>BE(sat)</sub>	_	-	1.0	V
Base – Emitter Turn–on Voltage (Note 3) (I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 2.0 V)	V <sub>BE(on)</sub>	-	-	0.90	V
Cutoff Frequency (I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 V, f = 100 MHz)	f <sub>T</sub>	_	120	-	MHz
Input Capacitance (V <sub>EB</sub> = 5.0 V, f = 1.0 MHz)	Cibo	_	360	-	pF
Output Capacitance (V <sub>CB</sub> = 10 V, f = 1.0 MHz)	Cobo	-	30	-	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulsed Condition: Pulse Width = 300  $\mu$ s, Duty Cycle  $\leq$  2%.

#### NSS1C301ET4G

#### **TYPICAL CHARACTERISTICS**

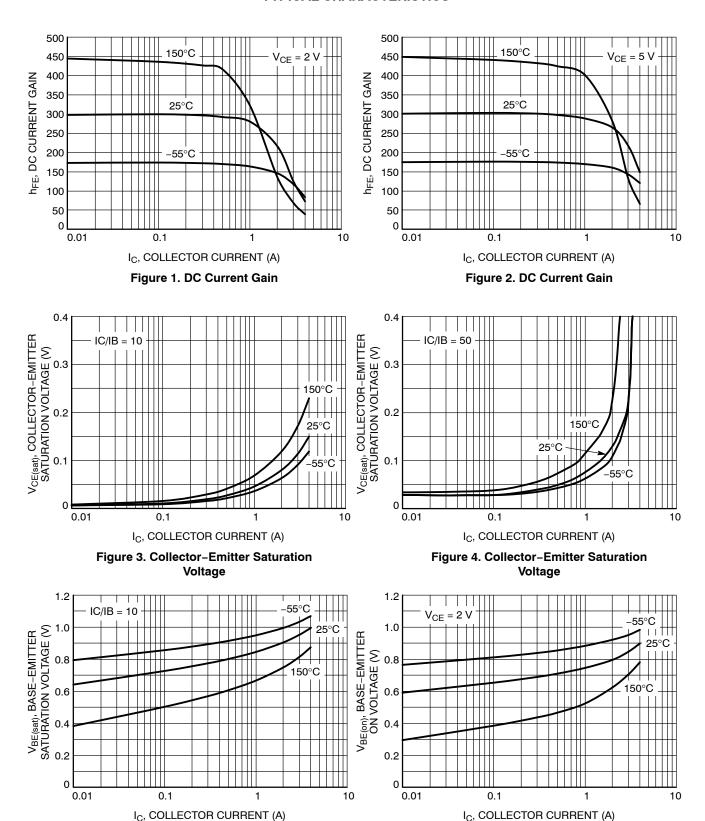


Figure 6. Base-Emitter "On" Voltage

Figure 5. Base-Emitter Saturation Voltage

#### NSS1C301ET4G

#### **TYPICAL CHARACTERISTICS**

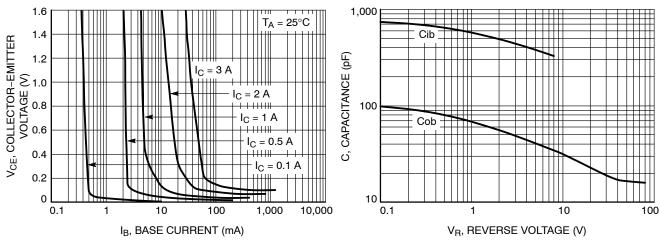


Figure 7. Collector Saturation Region

Figure 8. Capacitance

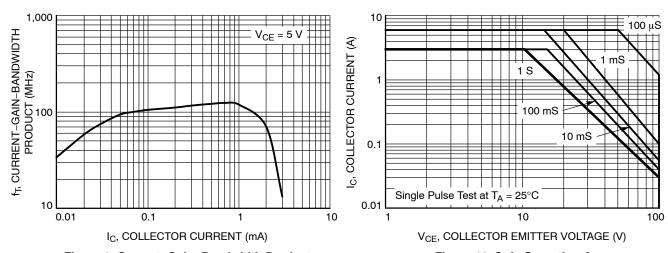


Figure 9. Current-Gain-Bandwidth Product

Figure 10. Safe Operating Area

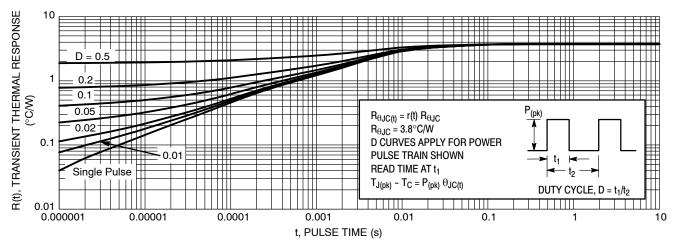
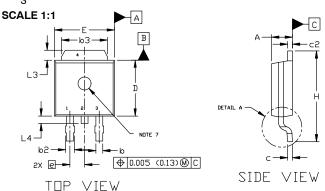


Figure 11. Typical Transient Thermal Response, Junction-to-Case





**DATE 31 MAY 2023** 



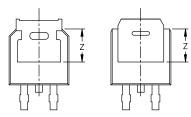


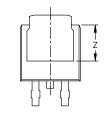
- DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994. CONTROLLING DIMENSION: INCHES
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS 63,
- L3. AND Z. L3, AND Z.

  DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH,
  PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR
  GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
  DIMENSIONS D AND E ARE DETERMINED AT THE
  OUTERMOST EXTREMES OF THE PLASTIC BODY.
  DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
  DETININAL MOLD ESCALUES.

- OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIMETERS	
MIM	MIN.	MAX.	MIN.	MAX.
Α	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
C	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29 BSC	
Н	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	0.114 REF		REF
L2	0.020 BSC		0.51	BSC
L3	0.035	0.050	0.89	1.27
L4		0.040		1.01
Z	0.155		3.93	

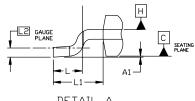




BOTTOM VIEW

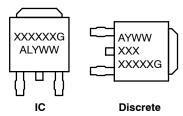
BOTTOM VIEW ALTERNATE CONSTRUCTIONS

5.80 [0.228] 6.20 [0.244] 2.58 3.00 [0.102] [0.118] 1.60 [0.063] 6.17 [0.243]



DETAIL A ROTATED 90° CW

**GENERIC MARKING DIAGRAM\*** 



XXXXXX	= Device Code
Α	= Assembly Location
L	= Wafer Lot
Υ	= Year
WW	= Work Week
G	= Pb-Free Package

\*This information is generic. Please refer to

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DUWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

3 FMITTER

4. COLLECTOR

s

3 GATE

RECOMMENDED MOUNTING FOOTPRINT\*

STYLE 1: STYLE 2: PIN 1. BASE PIN 1. GATE 2. COLLECTOR 2. DRAIL 3. EMITTER 3. SOUF 4. COLLECTOR 4. DRAIL	N 2. CATHODE RCE 3. ANODE	3. GATE	STYLE 5: PIN 1. GATE 2. ANODE 3. CATHODE 4. ANODE
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STYLE 7: PIN 1. GATE 2. COLLECTOR STYLE 6: STYLE 8: STYLE 9: STYLE 10: PIN 1. MT1 2. MT2 PIN 1. N/C 2. CATHODE 3. ANODE PIN 1. ANODE 2. CATHODE

4. CATHODE

device data sheet for actual part marking. PIN 1. CATHODE 2. ANODE 3. CATHODE Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may 3 RESISTOR ADJUST not follow the Generic Marking. 4. ANODE

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