NSS1C301ET4G

100 V, 3.0 A, Low $V_{CE(sat)}$ NPN Transistor

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

Features

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

MAXIMUM RATINGS (T_A = 25°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 − Peak	I_C	3.0 6.0	Adc
Base Current	I_B	0.5	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	33 0.26	W W/°C
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 2.1 0.017	 W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 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. These ratings are applicable when surface mounted on the minimum pad sizes recommended.

ON Semiconductor®

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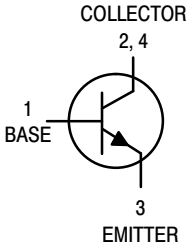
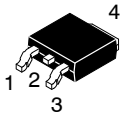
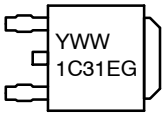
100 VOLTS, 3.0 AMPS 12.5 WATTS NPN LOW $V_{CE(sat)}$ TRANSISTOR





DPAK
CASE 369C
STYLE 1

MARKING DIAGRAM



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

ORDERING INFORMATION

Device	Package	Shipping†
NSS1C301ET4G	DPAK (Pb−Free)	2500/ Tape & Reel
NSV1C301ET4G	DPAK (Pb−Free)	2500/ Tape & Reel

†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.

THERMAL CHARACTERISTICS

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

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

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)	$V_{(BR)CEO}$	100			V
Collector − Base Breakdown Voltage (I_C = 0.1 mA, I_E = 0)	$V_{(BR)CBO}$	140			V
Emitter − Base Breakdown Voltage (I_E = 0.1 mA, I_C = 0)	$V_{(BR)EBO}$	6.0			V
Collector Cutoff Current (V_{CB} = 140 V, I_E = 0)	I_{CBO}			0.1	μA
Emitter Cutoff Current (V_{EB} = 6.0 V)	I_{EBO}			0.1	μA
ON CHARACTERISTICS					
DC Current Gain (Note 3) (I_C = 0.1 A, V_{CE} = 2.0 V) (I_C = 0.5 A, V_{CE} = 2.0 V) (I_C = 1.0 A, V_{CE} = 2.0 V) (I_C = 3.0 A, V_{CE} = 2.0 V)	h_{FE}	 200 200 120 80		 360	
Collector − Emitter Saturation Voltage (Note 3) (I_C = 0.1 A, I_B = 10 mA) (I_C = 1.0 A, I_B = 0.100 A) (I_C = 2.0 A, I_B = 0.200 A) (I_C = 3.0 A, I_B = 0.300 A)	$V_{CE(sat)}$		 0.015 0.045 0.080 0.115	 0.050 0.090 0.150 0.250	V
Base − Emitter Saturation Voltage (Note 3) (I_C = 1.0 A, I_B = 0.1 A)	$V_{BE(sat)}$			 1.0	V
Base − Emitter Turn−on Voltage (Note 3) (I_C = 1.0 A, V_{CE} = 2.0 V)	$V_{BE(on)}$			 0.90	V
Cutoff Frequency (I_C = 500 mA, V_{CE} = 10 V, f = 100 MHz)	f_T		 120		MHz
Input Capacitance (V_{EB} = 5.0 V, f = 1.0 MHz)	Cibo		360		pF
Output Capacitance (V_{CB} = 10 V, f = 1.0 MHz)	Cobo		30		pF

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

TYPICAL CHARACTERISTICS

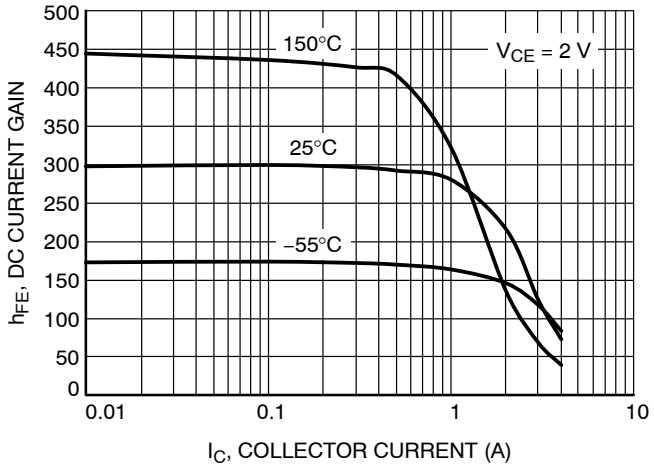


Figure 1. DC Current Gain

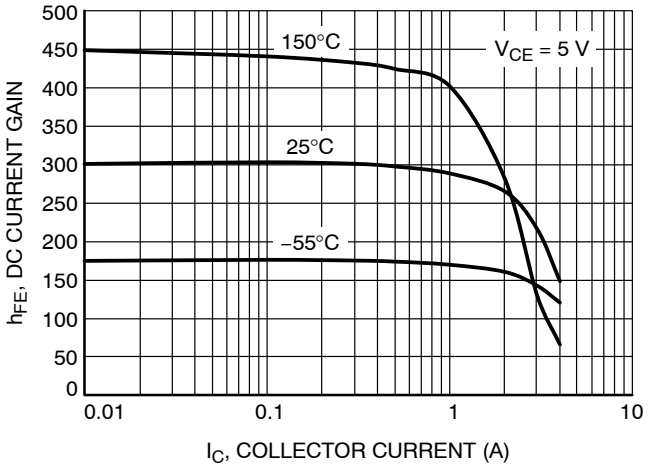


Figure 2. DC Current Gain

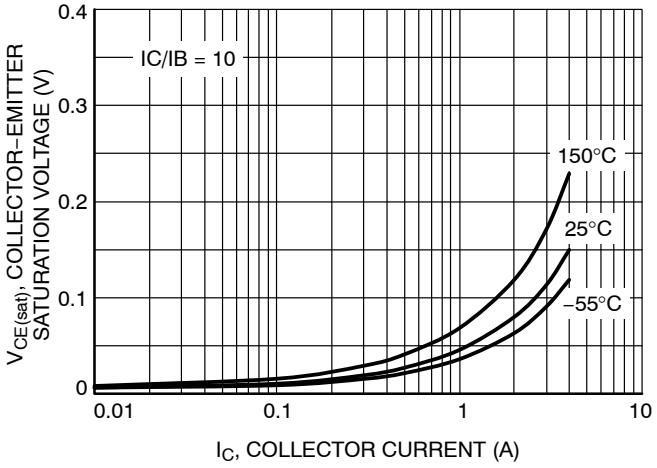


Figure 3. Collector−Emitter Saturation Voltage

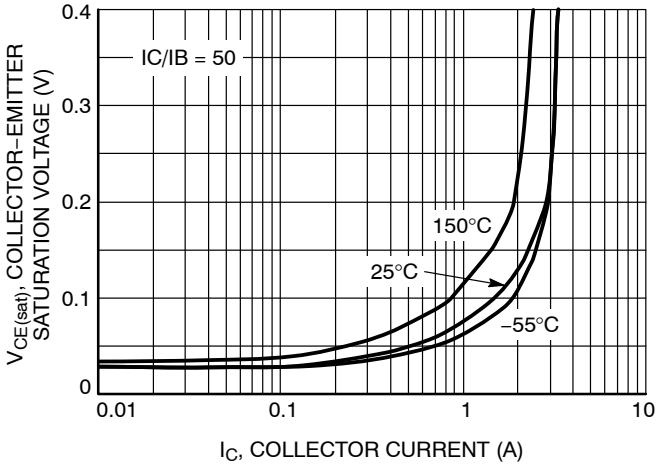


Figure 4. Collector−Emitter Saturation Voltage

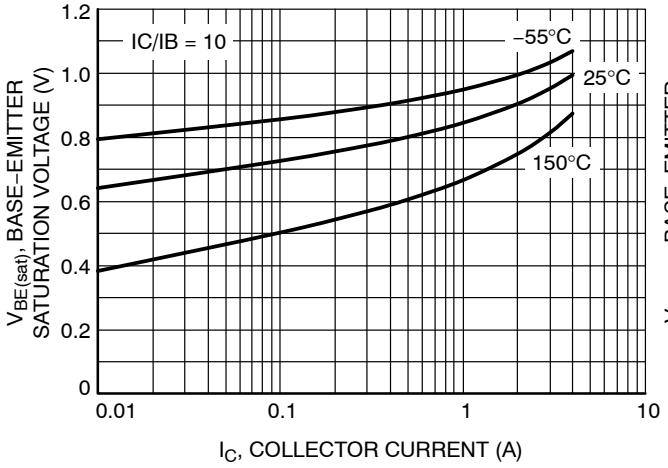


Figure 5. Base−Emitter Saturation Voltage

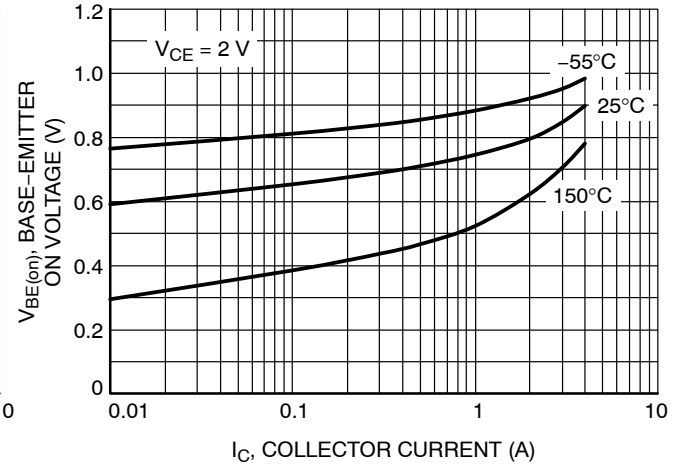


Figure 6. Base−Emitter “On” Voltage

TYPICAL CHARACTERISTICS

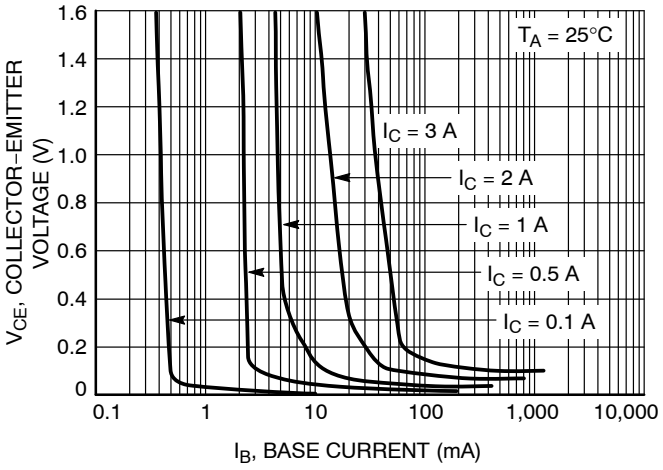


Figure 7. Collector Saturation Region

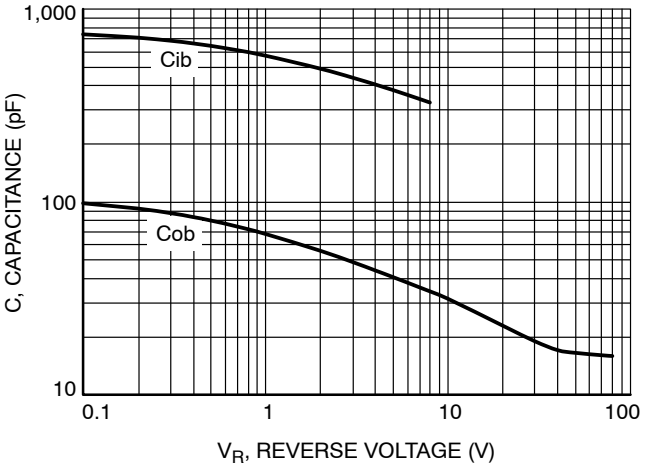


Figure 8. Capacitance

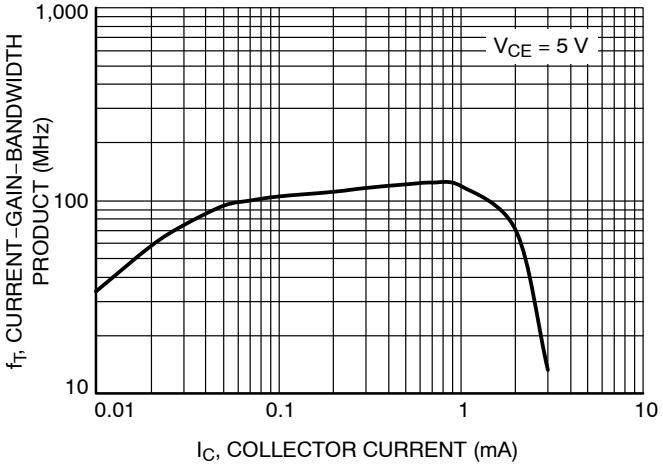


Figure 9. Current−Gain−Bandwidth Product

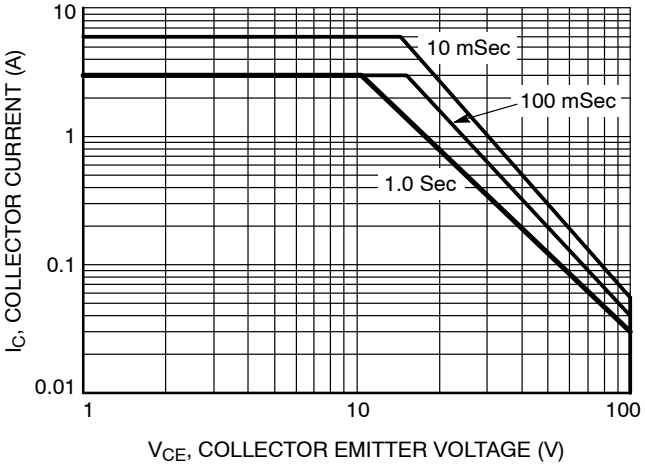


Figure 10. Safe Operating Area

TYPICAL CHARACTERISTICS

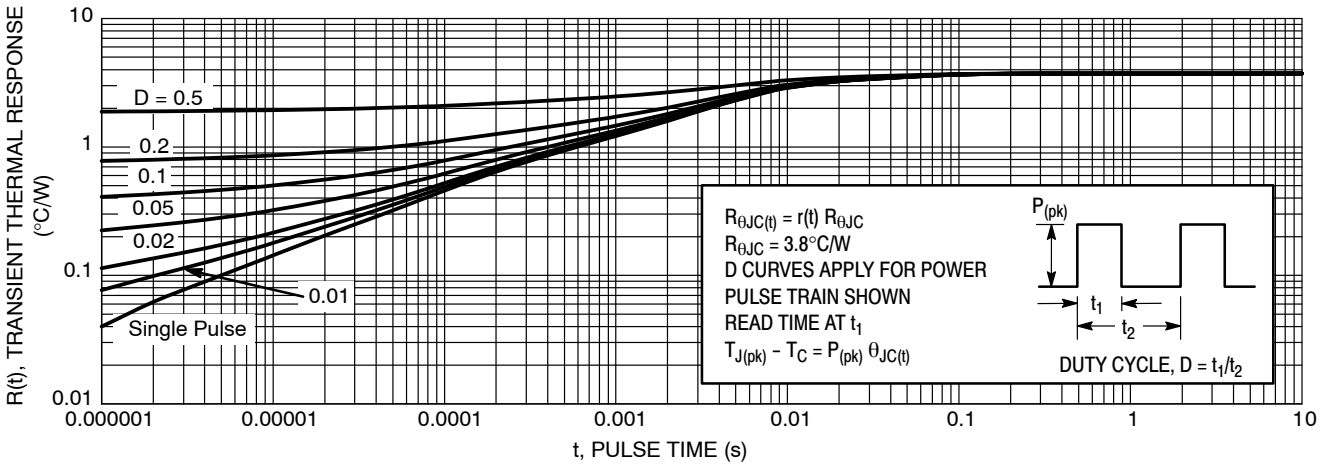
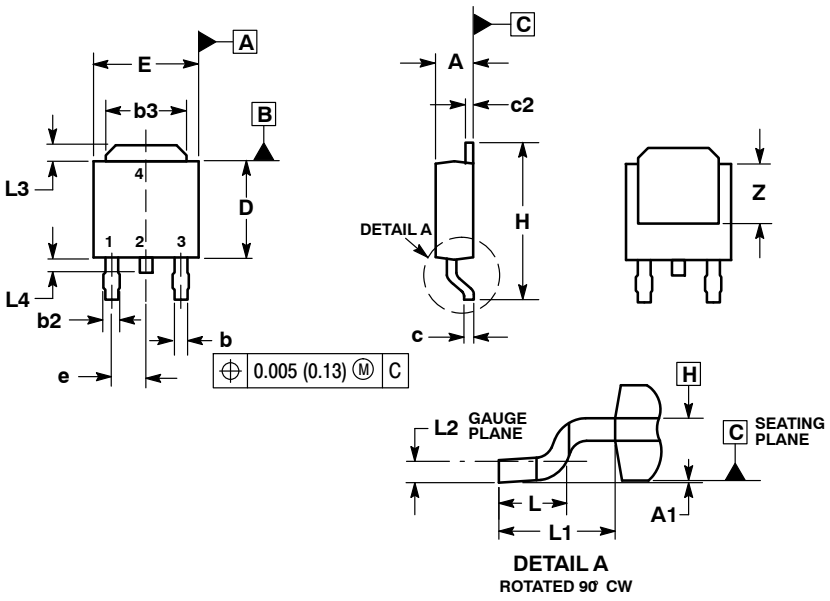


Figure 11. Typical Transient Thermal Response, Junction−to−Case

PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE D

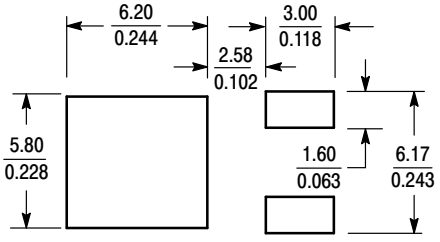


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	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	0.030	0.045	0.76	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	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 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	---

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

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

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

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Phone: 81−3−5817−1050

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

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

For additional information, please contact your local Sales Representative