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

ON Semiconductor'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 e²PowerEdge 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 $(T_A = 25^{\circ}C)$

(A)				
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	I _C	3.0	Adc	
Collector Current - Peak	I _{CM}	6.0	Adc	
Base Current	Ι _Β	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	

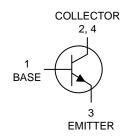
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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.

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

THERMAL CHARACTERISTICS

Characteristic		Max	Unit
Thermal Resistance, Junction-to-Case	$R_{ heta JC}$	3.8	°C/W
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{ heta JA}$	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	Тур	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	μΑ
Emitter Cutoff Current (V _{EB} = 6.0 V)	I _{EBO}	_	-	0.1	μΑ
ON CHARACTERISTICS			-	•	•
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 _{FE}	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 _{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 ($I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ V}$, $f = 100 \text{ MHz}$)	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 μsec , Duty Cycle \leq 2%.

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.

TYPICAL CHARACTERISTICS

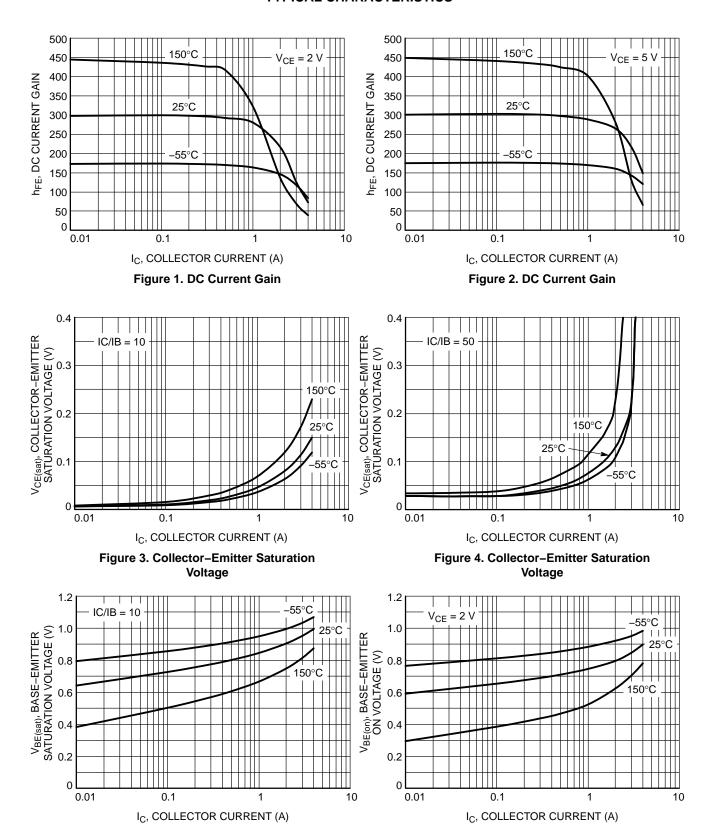


Figure 5. Base-Emitter Saturation Voltage

Figure 6. Base-Emitter "On" Voltage

TYPICAL CHARACTERISTICS

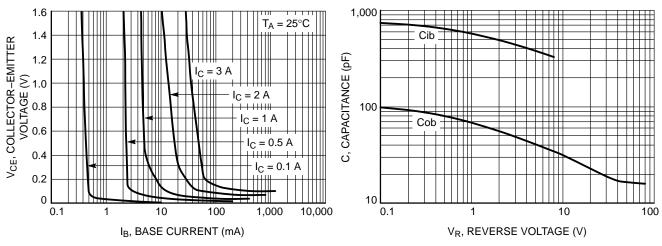


Figure 7. Collector Saturation Region

Figure 8. Capacitance

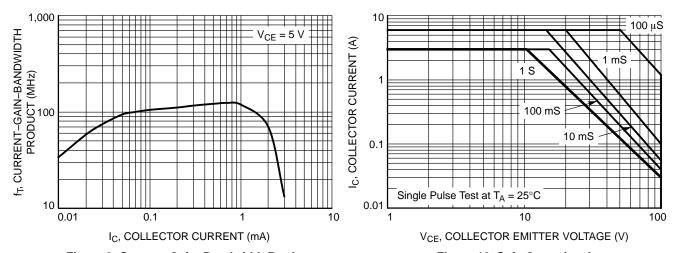


Figure 9. Current-Gain-Bandwidth Product

Figure 10. Safe Operating Area

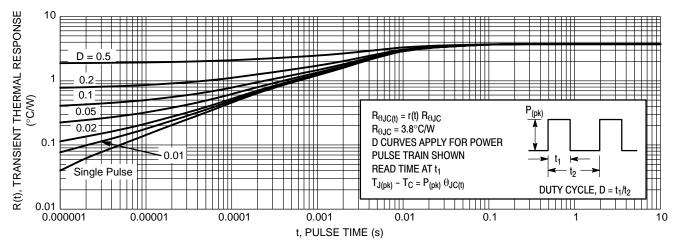
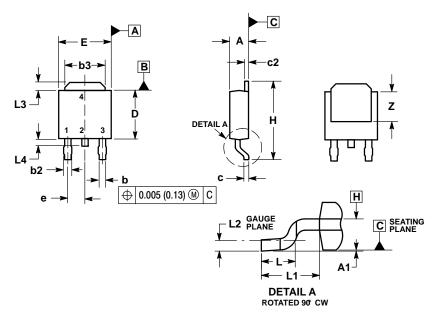


Figure 11. Typical Transient Thermal Response, Junction-to-Case

PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE)

CASE 369C ISSUE D



- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. 2. CONTROLLING DIMENSION: INCHES
- THERMAL PAD CONTOUR OPTIONAL WITHIN DI-MENSIONS b3, L3 and Z.
- MENSIONS 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

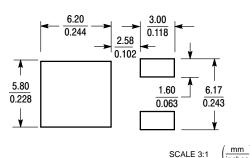
	INCHES		MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
Α	0.086	0.094	2.18	2.38	
A1	0.000	0.005	0.00	0.13	
b	0.025	0.035	0.63	0.89	
b2	0.030	0.045	0.76	1.14	
b3	0.180	0.215	4.57	5.46	
С	0.018	0.024	0.46	0.61	
c2	0.018	0.024	0.46	0.61	
D	0.235	0.245	5.97	6.22	
E	0.250	0.265	6.35	6.73	
е	0.090 BSC		2.29 BSC		
Н	0.370	0.410	9.40	10.41	
L	0.055	0.070	1.40	1.78	
L1	0.108 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

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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