40 V, 2.0 A, Low $V_{CE(sat)}$ PNP Transistor

NSS40200UW6T1G, NSV40200UW6T1G

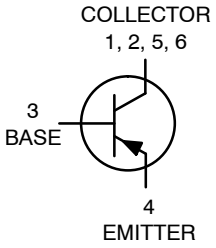
onsemi's e^2PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

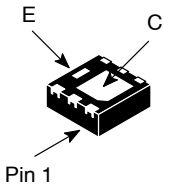
Typical applications are DC−DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and 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

- 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, Halogen Free/BFR Free and are RoHS Compliant

−40 VOLTS
2.0 AMPS
PNP LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 100 mΩ





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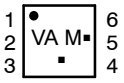
MARKING DIAGRAM



VA = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NSS40200UW6T1G	WDFN6 (Pb−Free)	3000/ Tape & Reel
NSV40200UW6T1G	WDFN6 (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.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	−40	Vdc
Collector-Base Voltage	V_{CBO}	−40	Vdc
Emitter-Base Voltage	V_{EBO}	−7.0	Vdc
Collector Current − Continuous	I_C	−2.0	Adc
Collector Current − Peak	I_{CM}	−4.0	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)	875 7.0	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	143	°C/W
Total Device Dissipation, T_A = 25°C Derate above 25°C	P_D (Note 2)	1.5 11.8	W mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	85	°C/W
Thermal Resistance, Junction−to−Lead #1	$R_{\theta JL}$ (Note 2)	23	°C/W
Total Device Dissipation (Single Pulse < 10 sec)	$P_{Dsingle}$ (Notes 2 & 3)	3.0	W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 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.

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

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)	$V_{(BR)CEO}$	−40	–	–	Vdc
Collector – Base Breakdown Voltage (I_C = −0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	−40	–	–	Vdc
Emitter – Base Breakdown Voltage (I_E = −0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	−7.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = −40 Vdc, I_E = 0)	I_{CBO}	–	–	−0.1	μAdc
Emitter Cutoff Current (V_{EB} = −7.0 Vdc)	I_{EBO}	–	–	−0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 4) (I_C = −10 mA, V_{CE} = −2.0 V) (I_C = −500 mA, V_{CE} = −2.0 V) (I_C = −1.0 A, V_{CE} = −2.0 V) (I_C = −2.0 A, V_{CE} = −2.0 V)	h_{FE}	 150 150 150 150	 – – – –	 – – – –	
Collector – Emitter Saturation Voltage (Note 4) (I_C = −0.1 A, I_B = −0.010 A) (Note 5) (I_C = −1.0 A, I_B = −0.100 A) (I_C = −1.0 A, I_B = −0.010 A) (I_C = −2.0 A, I_B = −0.020 A)	$V_{CE(sat)}$	 – – – –	 – −0.100 – –	 −0.020 −0.120 −0.200 −0.300	V
Base – Emitter Saturation Voltage (Note 4) (I_C = −1.0 A, I_B = −0.01 A)	$V_{BE(sat)}$	–	−0.76	−0.900	V
Base – Emitter Turn−on Voltage (Note 4) (I_C = −2.0 A, V_{CE} = −3.0 V)	$V_{BE(on)}$	–	−0.80	−0.900	V
Cutoff Frequency (I_C = −100 mA, V_{CE} = −5.0 V, f = 100 MHz)	f_T	140	–	–	MHz
Input Capacitance (V_{EB} = −0.5 V, f = 1.0 MHz)	Cibo	–		500	pF
Output Capacitance (V_{CB} = −3.0 V, f = 1.0 MHz)	Cobo	–		100	pF
SWITCHING CHARACTERISTICS					
Delay (V_{CC} = 30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_d	–	–	70	ns
Rise (V_{CC} = 30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_r	–	–	150	ns
Storage (V_{CC} = 30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_s	–	–	525	ns
Fall (V_{CC} = 30 V, I_C = 750 mA, I_{B1} = 15 mA)	t_f	–	–	155	ns

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.

4. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%.
5. Guaranteed by design but not tested.

TYPICAL CHARACTERISTICS

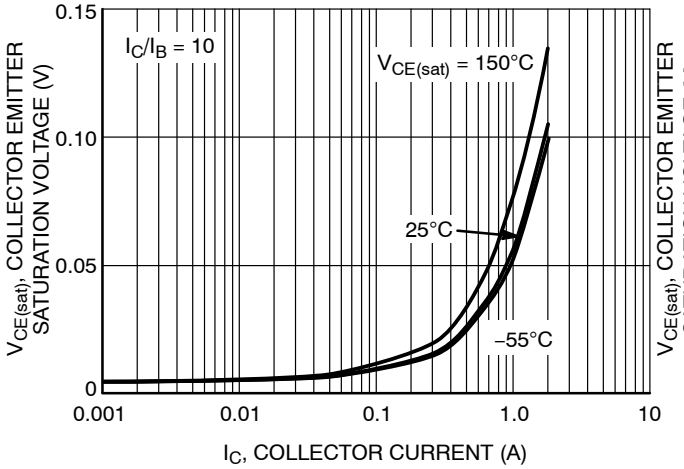


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

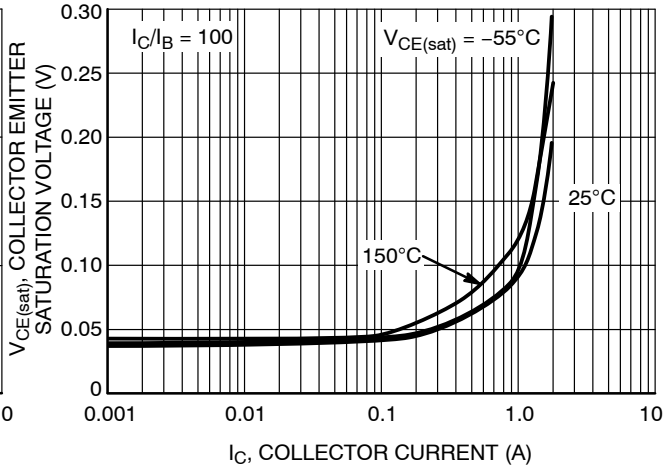


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

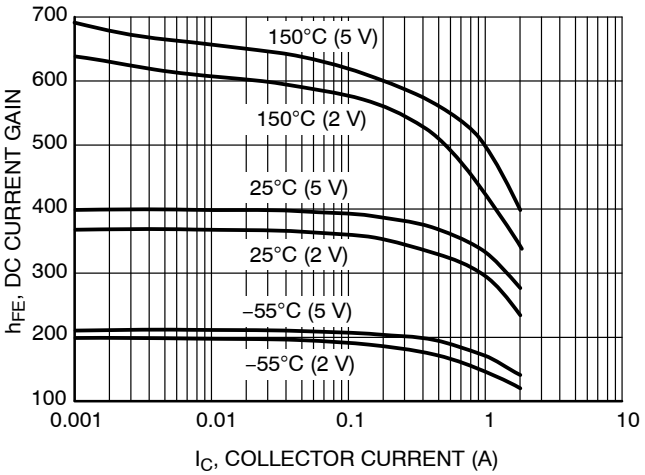


Figure 3. DC Current Gain vs. Collector Current

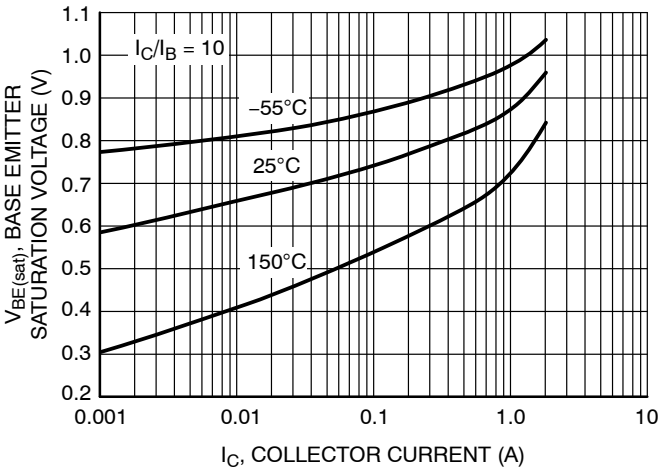


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

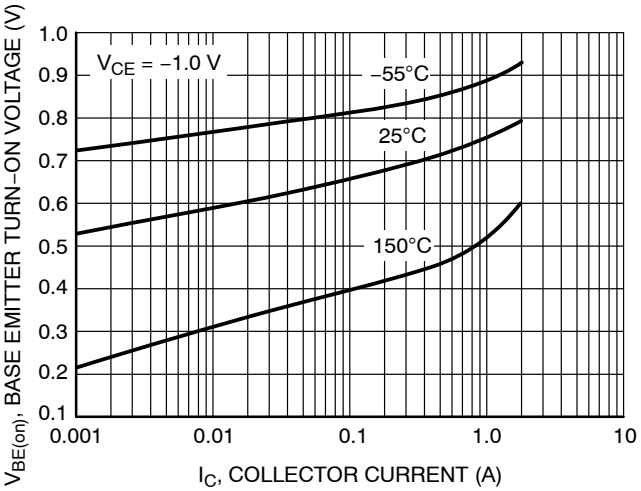


Figure 5. Base Emitter Turn−On Voltage vs. Collector Current

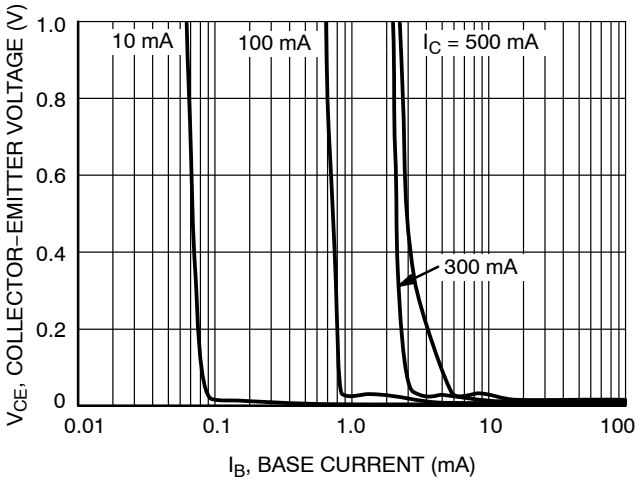


Figure 6. Saturation Region

TYPICAL CHARACTERISTICS

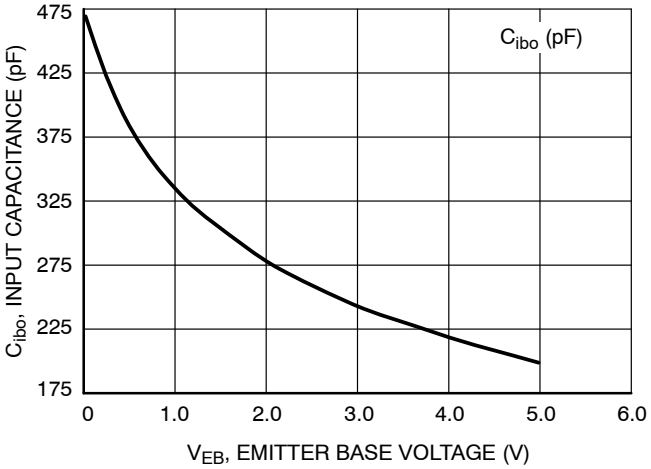


Figure 7. Input Capacitance

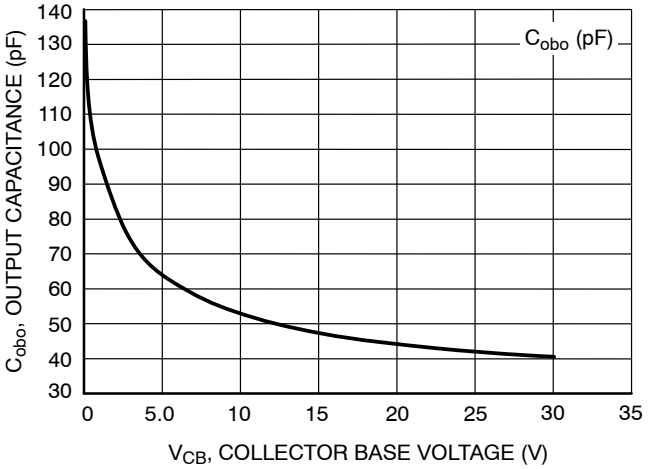


Figure 8. Output Capacitance

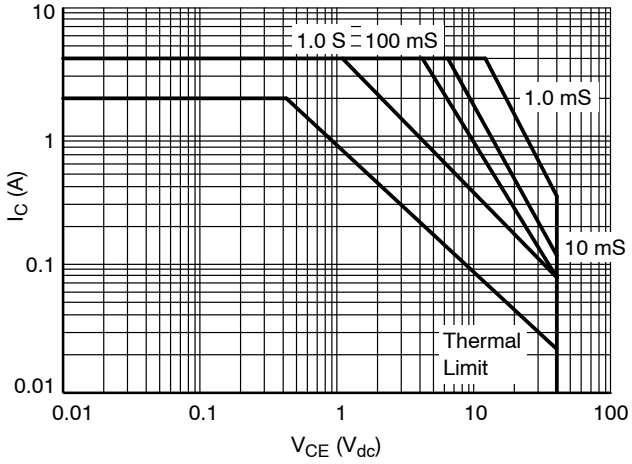


Figure 9. PNP Safe Operating Area

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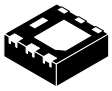
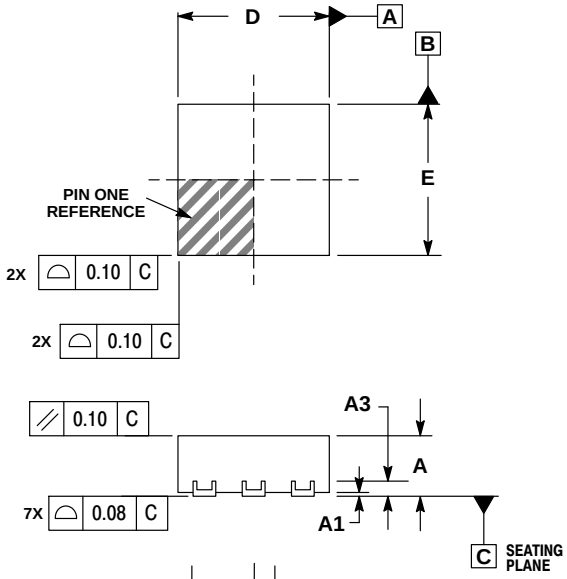
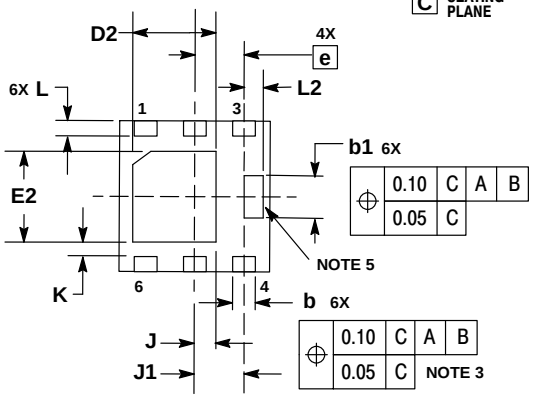
ISSUE B

DATE 26 APR 2006



SCALE 4:1





BOTTOM VIEW

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

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

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
1. CENTER TERMINAL LEAD IS OPTIONAL. TERMINAL LEAD IS CONNECTED TO TERMINAL LEAD # 4.
2. PINS 1, 2, 5 AND 6 ARE TIED TO THE FLAG.

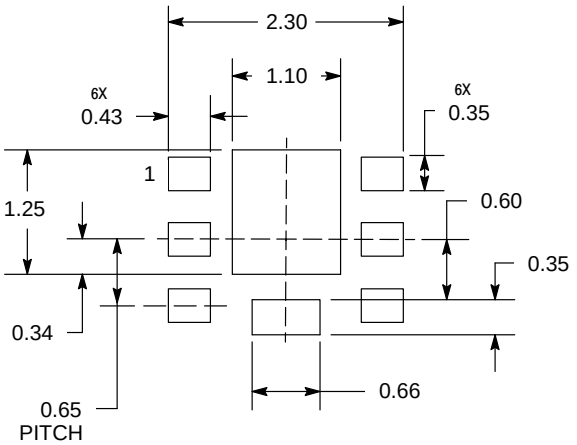
	MILLIMETERS	
DIM	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
b1	0.51	0.61
D	2.00 BSC	
D2	1.00	1.20
E	2.00 BSC	
E2	1.10	1.30
e	0.65 BSC	
K	0.15 REF	
L	0.20	0.30
L2	0.20	0.30
J	0.27 REF	
J1	0.65 REF	

GENERIC MARKING DIAGRAM*

XX = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

SOLDERMASK DEFINED MOUNTING FOOTPRINT



DIMENSIONS: MILLIMETERS

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DESCRIPTION:	**6 PIN WDFN 2X2, 0.65P**	**PAGE 1 OF 1**

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