onsemi

DATA SHEET
www.onsemi.com

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

NSS40200UW6T1G, NSV40200UW6T1G

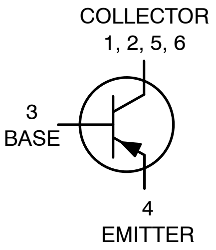
onsemi's e^{2}PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control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

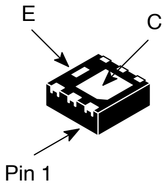
Typical applications are DC−DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and 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^{2}PowerEdge 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

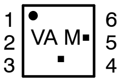
−40 VOLTS
2.0 AMPS
PNP LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 100 mΩ





WDFN6
CASE 506AP

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	$V_{(BR)CEO}$				Vdc
(I_C = −10 mAdc, I_B = 0)		−40	–	–	
Collector – Base Breakdown Voltage	$V_{(BR)CBO}$				Vdc
(I_C = −0.1 mAdc, I_E = 0)		−40	–	–	
Emitter – Base Breakdown Voltage	$V_{(BR)EBO}$				Vdc
(I_E = −0.1 mAdc, I_C = 0)		−7.0	–	–	
Collector Cutoff Current	I_{CBO}				μAdc
(V_{CB} = −40 Vdc, I_E = 0)		–	–	−0.1	
Emitter Cutoff Current	I_{EBO}				μAdc
(V_{EB} = −7.0 Vdc)		–	–	−0.1	
ON CHARACTERISTICS					
DC Current Gain (Note 4)	h_{FE}				
(I_C = −10 mA, V_{CE} = −2.0 V)		150	–	–	
(I_C = −500 mA, V_{CE} = −2.0 V)		150	–	–	
(I_C = −1.0 A, V_{CE} = −2.0 V)		150	–	–	
(I_C = −2.0 A, V_{CE} = −2.0 V)		150	–	–	
Collector – Emitter Saturation Voltage (Note 4)	$V_{CE(sat)}$				V
(I_C = −0.1 A, I_B = −0.010 A) (Note 5)		–	–	−0.020	
(I_C = −1.0 A, I_B = −0.100 A)		–	−0.100	−0.120	
(I_C = −1.0 A, I_B = −0.010 A)		–	–	−0.200	
(I_C = −2.0 A, I_B = −0.020 A)		–	–	−0.300	
Base – Emitter Saturation Voltage (Note 4)	$V_{BE(sat)}$				V
(I_C = −1.0 A, I_B = −0.01 A)		–	−0.76	−0.900	
Base – Emitter Turn–on Voltage (Note 4)	$V_{BE(on)}$				V
(I_C = −2.0 A, V_{CE} = −3.0 V)		–	−0.80	−0.900	
Cutoff Frequency	f_T				MHz
(I_C = −100 mA, V_{CE} = −5.0 V, f = 100 MHz)		140	–	–	
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

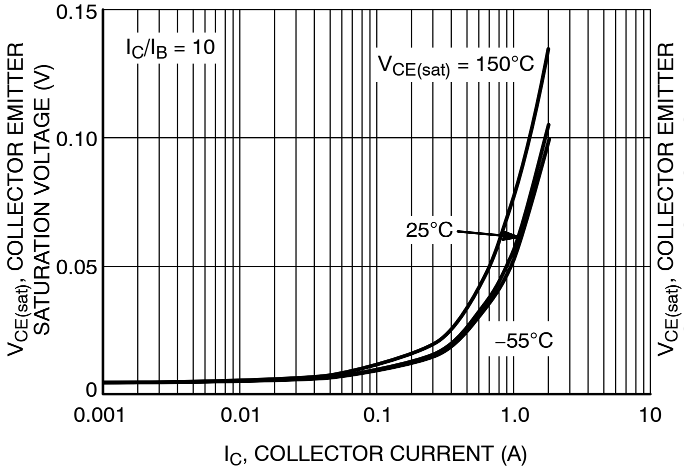


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

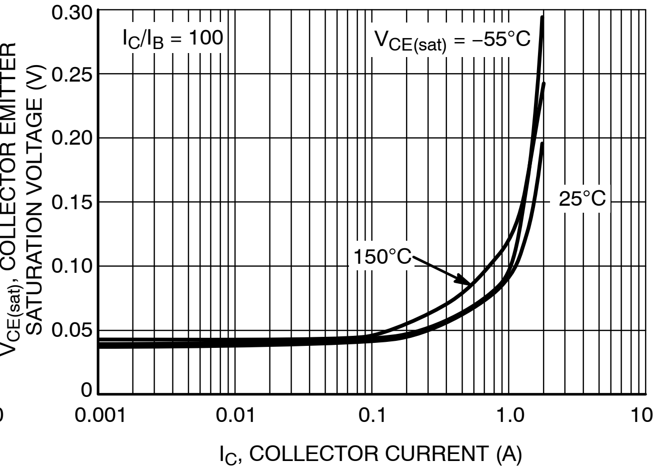


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

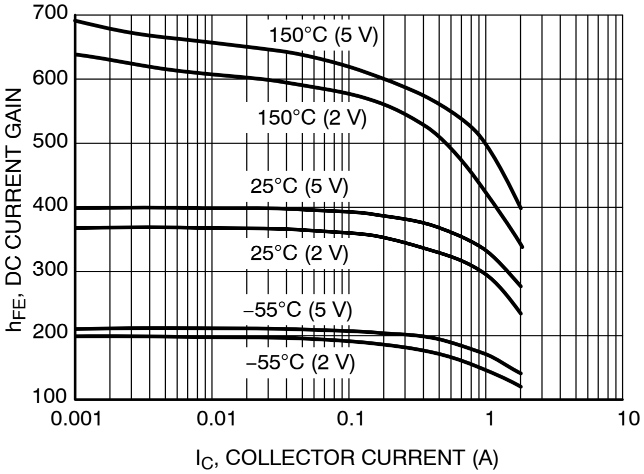


Figure 3. DC Current Gain vs. Collector Current

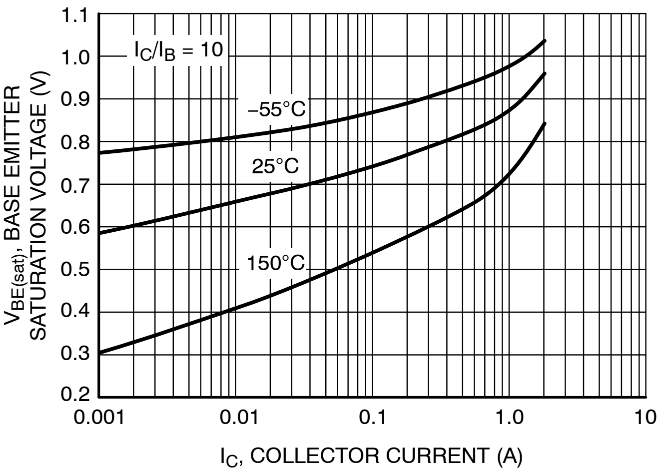


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

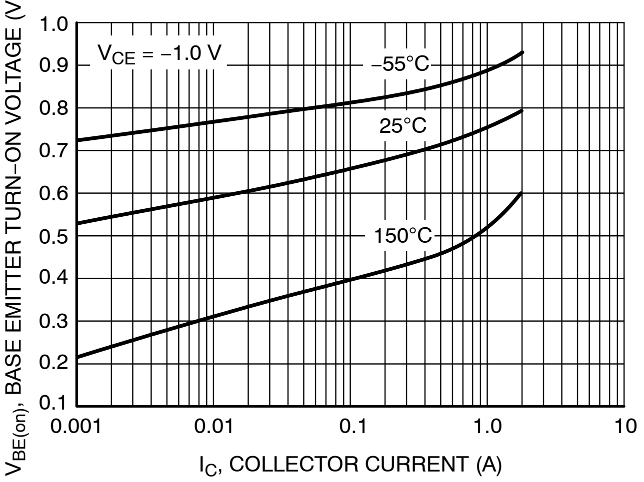


Figure 5. Base Emitter Turn−On Voltage vs. Collector Current

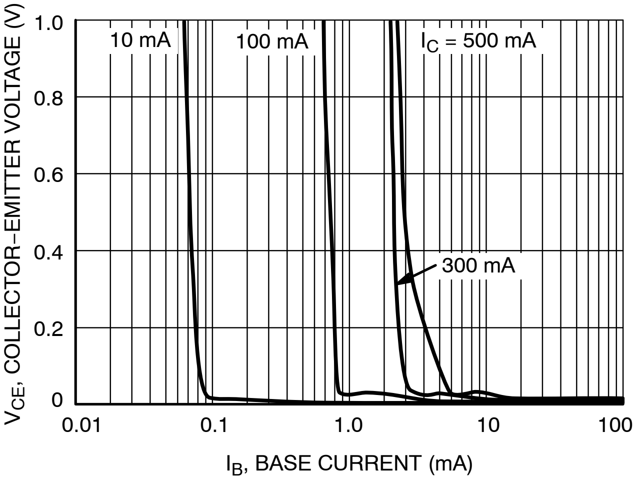


Figure 6. Saturation Region

TYPICAL CHARACTERISTICS

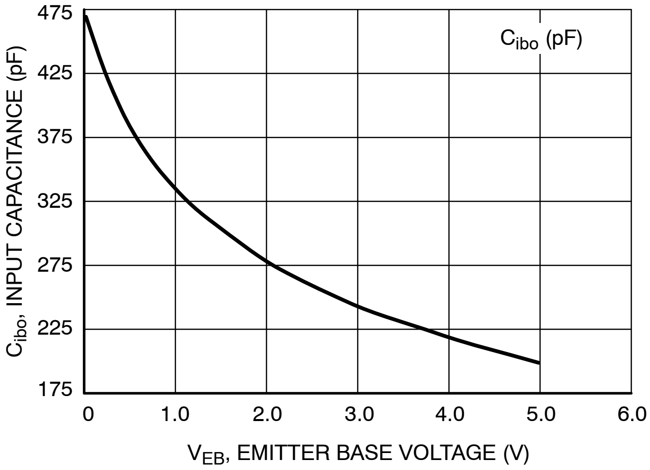


Figure 7. Input Capacitance

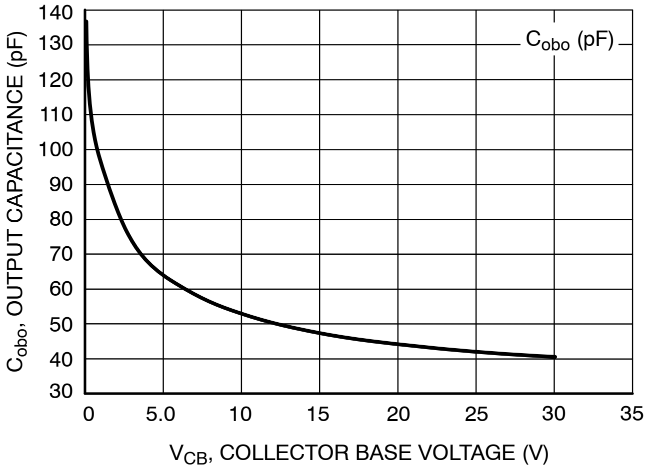


Figure 8. Output Capacitance

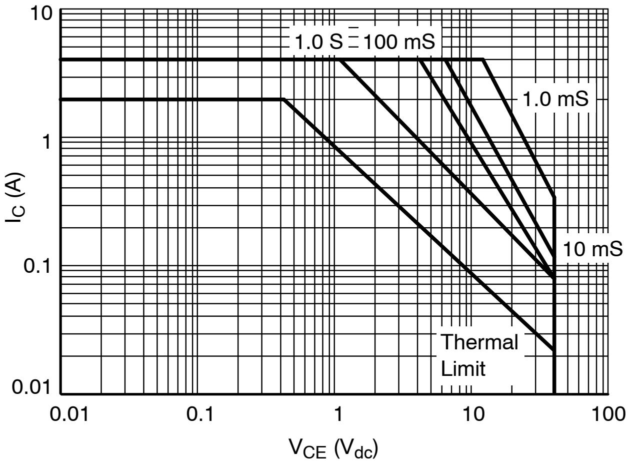
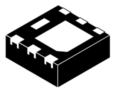


Figure 9. PNP Safe Operating Area

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

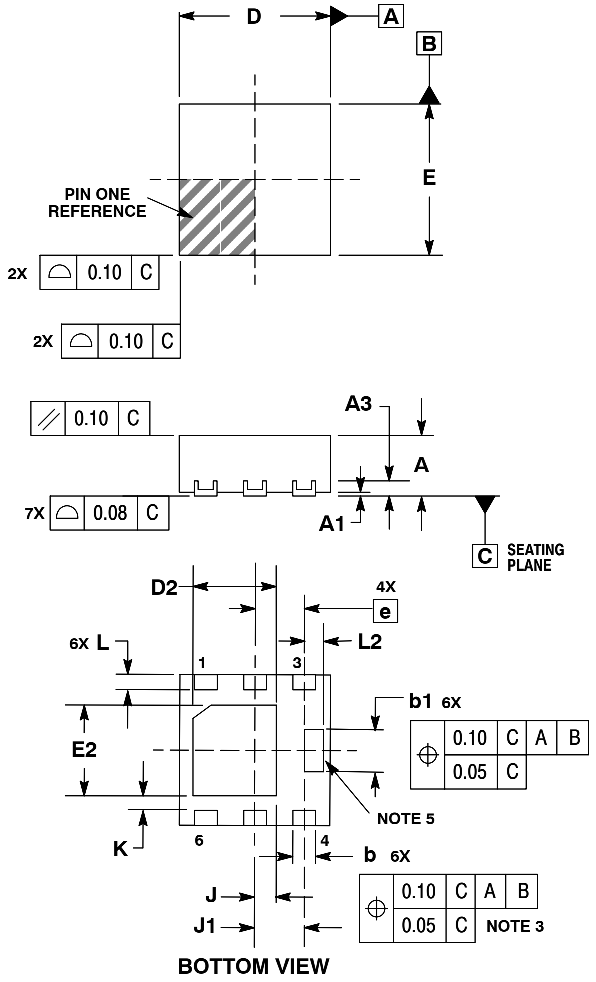
ON Semiconductor®



WDFN6 2x2
CASE 506AP−01
ISSUE B

DATE 26 APR 2006

SCALE 4:1



BOTTOM VIEW

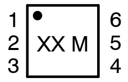
STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

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	

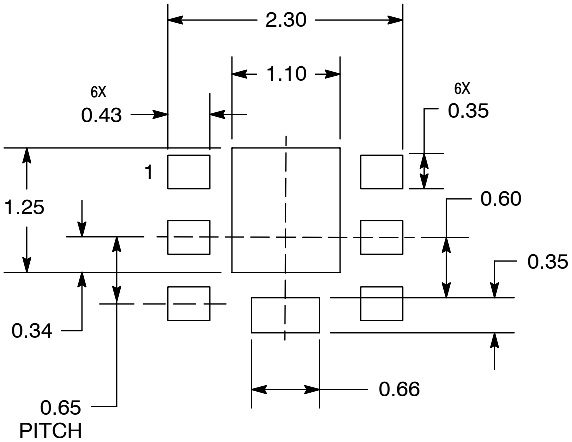
GENERIC MARKING DIAGRAM*



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

DOCUMENT NUMBER:	**98AON20860D**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**6 PIN WDFN 2X2, 0.65P**	**PAGE 1 OF 1**

onsemi, onsemi, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba “**onsemi**” or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**’s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided “as−is” and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. “Typical” parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales