20 V, 7.0 A, Low V_{CE(sat)} **NPN Transistor**

ON Semiconductor's e²PowerEdge 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 e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

• This is a Pb-Free Device

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

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V _{CBO}	20	Vdc
Emitter-Base Voltage	V _{EBO}	6.0	Vdc
Collector Current - Continuous	I _C	5.0	Adc
Collector Current - Peak	I _{CM}	7.0	Α
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 _{θJA} (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 _{θJA} (Note 2)	85	°C/W
Thermal Resistance, Junction-to-Lead #3	R _{θJL} (Note 2)	23	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 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.

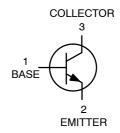
- 1. FR-4 @ 100 mm², 1 oz copper traces. 2. FR-4 @ 500 mm², 1 oz copper traces.



ON Semiconductor®

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20 VOLTS, 7.0 AMPS NPN LOW V_{CE(sat)} TRANSISTOR EQUIVALENT R_{DS(on)} 31 mΩ





WDFN3 CASE 506AU

MARKING DIAGRAM



VD = Specific Device Code

M = Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
NSS20501UW3T2G	WDFN3 (Pb-Free)	3000/ Tape & Reel
NSS20501UW3TBG	WDFN3 (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.

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}C$ unless otherwise noted)

Symbol	Min	Typical	Max	Unit
1				
V _{(BR)CEO}	20	-	-	Vdc
V _{(BR)CBO}	20	-	-	Vdc
V _{(BR)EBO}	6.0	-	-	Vdc
I _{CBO}	-	-	0.1	μAdc
I _{EBO}	-	-	0.1	μAdc
h _{FE}	200 200 200 200 200 180	- 325 310 300	- - - -	
V _{CE(sat)}	- - - -	0.007 0.031 0.045 0.070 0.120 0.110	0.008 0.040 0.075 0.100 0.135 0.125	V
V _{BE(sat)}	-	0.760	0.900	V
V _{BE(on)}	-	0.730	0.900	V
f _T	150	-	_	MHz
Cibo	-		650	pF
Cobo	-		70	pF
t _d	-	-	90	ns
t _r	-	-	100	ns
t _s	-	-	500	ns
t _f	-	_	100	ns
	V(BR)CEO V(BR)CBO V(BR)EBO ICBO IEBO VCE(sat) VBE(on) f _T Cibo Cobo t _d t _r t _s	V(BR)CEO 20 V(BR)CBO 20 V(BR)EBO 6.0 ICBO - IEBO - NFE 200 200 200 200 200 200 180 VCE(sat) - VBE(sat) - VBE(sat) - VBE(on) - f _T 150 Cibo - Cobo - t _d - t _r - t _s - t _s -	V(BR)CEO 20 - V(BR)CBO 20 - V(BR)EBO 6.0 - ICBO - - IEBO - - VCE(sat) - 0.007	V(BR)CEO 20 - - V(BR)CBO 20 - - V(BR)EBO 6.0 - - ICBO - - 0.1 IEBO - - 0.1 hFE 200 - - 200 325 - - 200 310 - - 200 310 - - 200 310 - - 200 310 - - 200 310 - - 200 310 - - 200 310 - - - 0.031 0.040 - - 0.045 0.075 - - 0.120 0.135 - - 0.120 0.135 - VBE(sat) - 0.760 0.900 VBE(sat) - - - <t< td=""></t<>

^{3.} Pulsed Condition: Pulse Width = 300 $\mu sec,$ Duty Cycle \leq 2%.

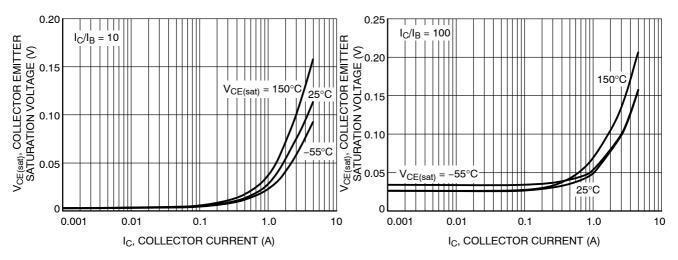


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

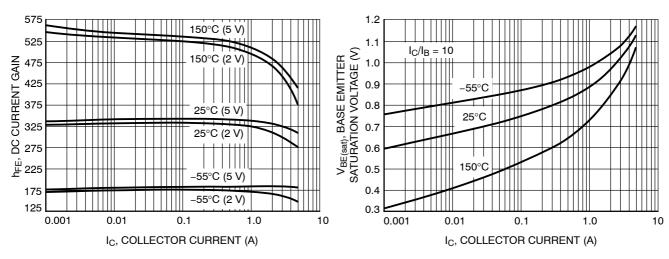


Figure 3. DC Current Gain vs. Collector Current

Figure 4. Base Emitter Saturation Voltage vs.
Collector Current

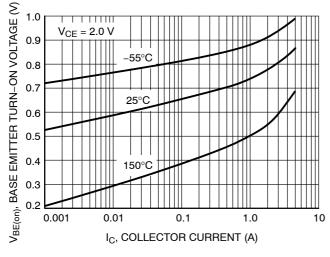


Figure 5. Base Emitter Turn-On Voltage vs. Collector Current

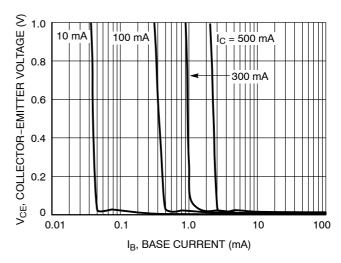


Figure 6. Saturation Region

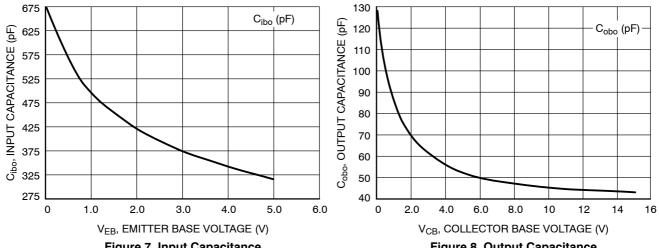


Figure 7. Input Capacitance

Figure 8. Output Capacitance

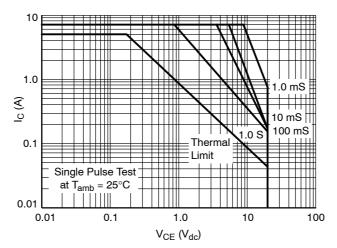
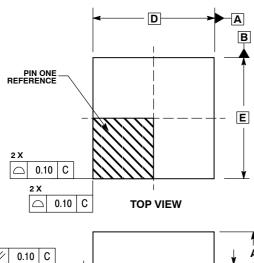
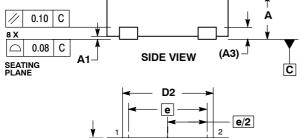


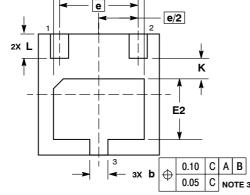
Figure 9. Safe Operating Area

PACKAGE DIMENSIONS

WDFN3 CASE 506AU **ISSUE 0**







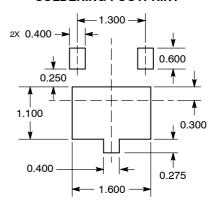
BOTTOM VIEW

NOTES

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- 2. 3. CONTROLLING DIMENSION: MILLIMETERS.
 DIMENSION & APPLIES TO PLATED TERMINAL AND IS
- MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00		0.05	0.000		0.002
A3	0.20 REF			0.008 REF		
b	0.25	0.30	0.35	0.010	0.012	0.014
D		2.00 BSC 0.079 BSC				
D2	1.40	1.50	1.60	0.055	0.059	0.063
E	2.00 BSC			0.079 BSC		
E2	0.90	1.00	1.10	0.035	0.039	0.043
е	1.30 BSC			0.051 BSC		
K	0.35 REF 0.014 RI			0.014 REF		
L	0.35	0.40	0.45	0.014	0.016	0.018

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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