

NSS40601CF8T1G

40 V, 8.0 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.

- This is a Pb-Free Device

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

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current – Continuous	I_C	6.0	Adc
Collector Current – Peak	I_{CM}	8.0	A
Electrostatic Discharge	ESD	HBM Class 3B MM Class C	

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation, $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D (Note 1)	830 6.7	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 1)	150	$^\circ\text{C}/\text{W}$
Total Device Dissipation, $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D (Note 2)	1.4 11.1	W mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 2)	90	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Lead #1	$R_{\theta JL}$ (Note 2)	15	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

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.

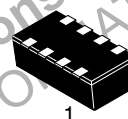
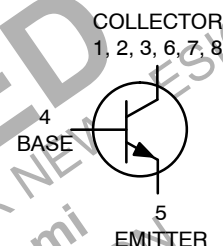
1. FR-4 @ 100 mm², 1 oz copper traces.
2. FR-4 @ 500 mm², 1 oz copper traces.



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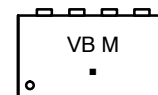
<http://onsemi.com>

40 VOLTS, 8.0 AMPS
NPN LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 31 m Ω



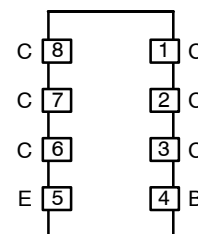
ChipFET™
CASE 1206A
STYLE 4

MARKING DIAGRAM



VB = Specific Device Code
M = Month Code
■ = Pb-Free Package

PIN CONNECTIONS



ORDERING INFORMATION

Device	Package	Shipping†
NSS40601CF8T1G	ChipFET (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.

NSS40601CF8T1G

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}	6.0	–	–	Vdc
Collector Cutoff Current (V _{CB} = 40 Vdc, I _E = 0)	I _{CBO}	–	–	0.1	μAdc
Emitter Cutoff Current (V _{EB} = 6.0 Vdc)	I _{EBO}	–	–	0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 3) (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) (I _C = 3.0 A, V _{CE} = 2.0 V)	h _{FE}	200 200 200 200 200	– – 395 – –	– – – – –	
Collector – Emitter Saturation Voltage (Note 3) (I _C = 0.1 A, I _B = 0.010 A) (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) (I _C = 3.0 A, I _B = 0.030 A) (I _C = 4.0 A, I _B = 0.400 A)	V _{CE(sat)}	– – – – – –	0.008 0.031 0.060 0.075 0.100 0.090	0.010 0.075 0.075 0.110 0.150 0.135	V
Base – Emitter Saturation Voltage (Note 3) (I _C = 1.0 A, I _B = 0.01 A)	V _{BE(sat)}	–	0.760	0.900	V
Base – Emitter Turn-on Voltage (Note 3) (I _C = 2.0 A, V _{CE} = 2.0 V)	V _{BE(on)}	–	0.720	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)	C _{ibo}	–	–	1200	pF
Output Capacitance (V _{CB} = 3.0 V, f = 1.0 MHz)	C _{obo}	–	–	100	pF
SWITCHING CHARACTERISTICS					
Delay (V _{CC} = 30 V, I _C = 750 mA, I _{B1} = 15 mA)	t _d	–	–	110	ns
Rise (V _{CC} = 30 V, I _C = 750 mA, I _{B1} = 15 mA)	t _r	–	–	130	ns
Storage (V _{CC} = 30 V, I _C = 750 mA, I _{B1} = 15 mA)	t _s	–	–	1400	ns
Fall (V _{CC} = 30 V, I _C = 750 mA, I _{B1} = 15 mA)	t _f	–	–	130	ns

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

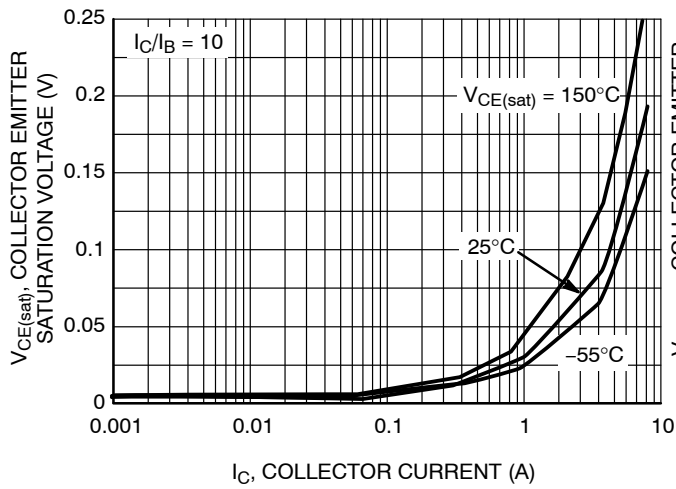


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

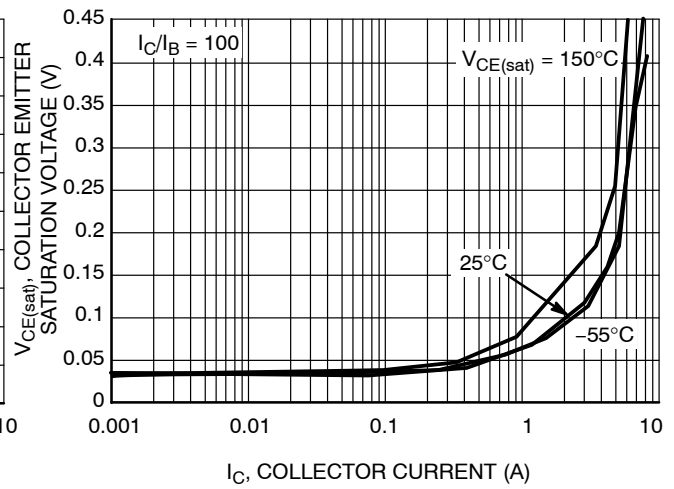


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

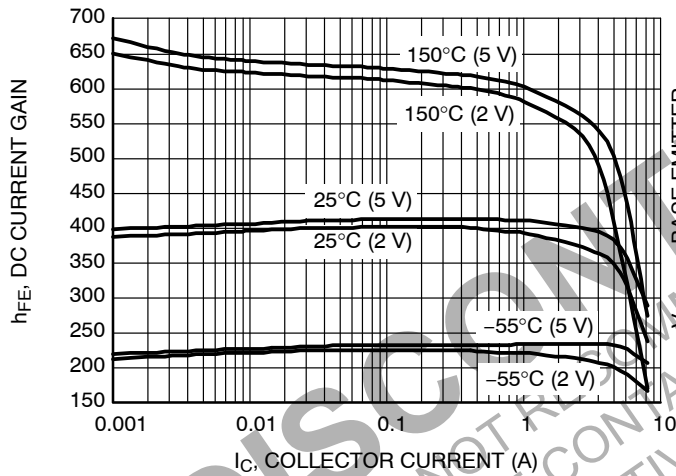


Figure 3. DC Current Gain vs. Collector Current

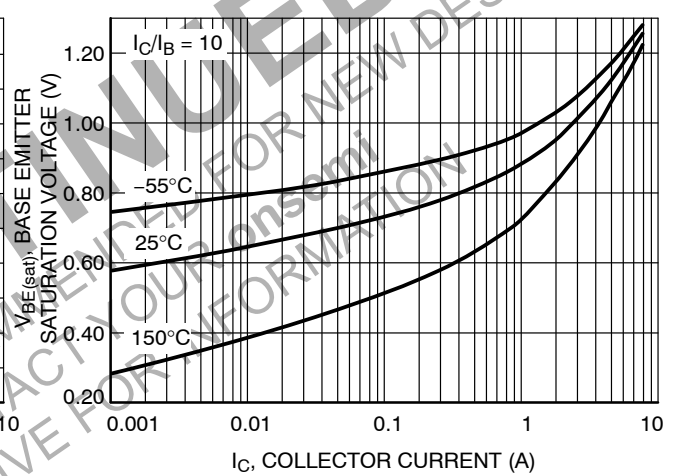


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

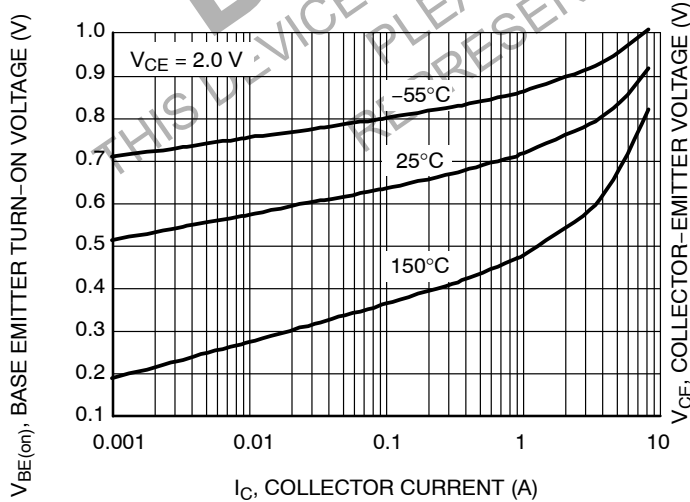


Figure 5. Base Emitter Turn-On Voltage vs. Collector Current

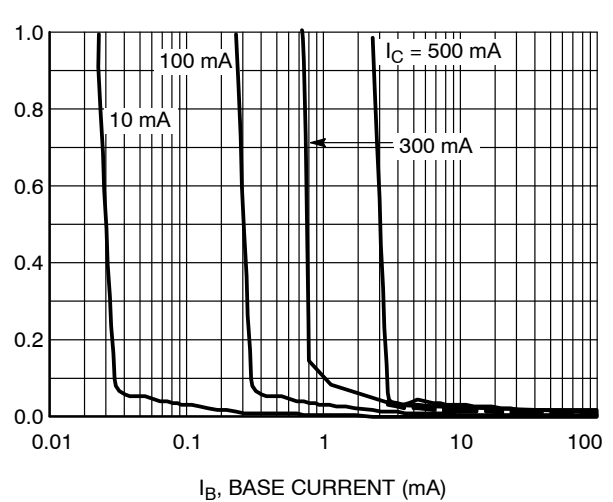


Figure 6. Saturation Region

NSS40601CF8T1G

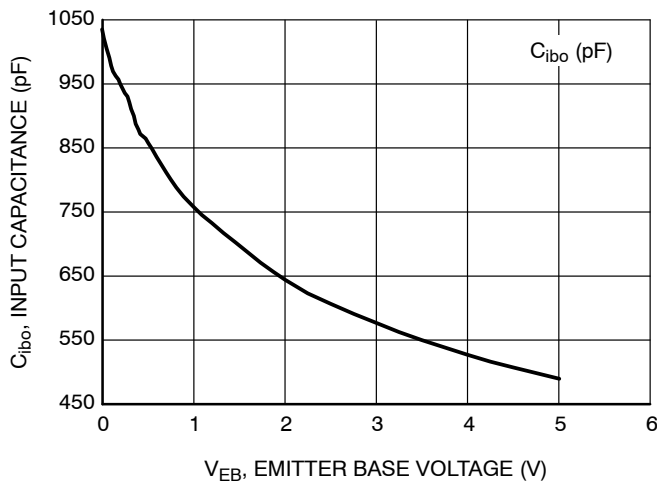


Figure 7. Input Capacitance

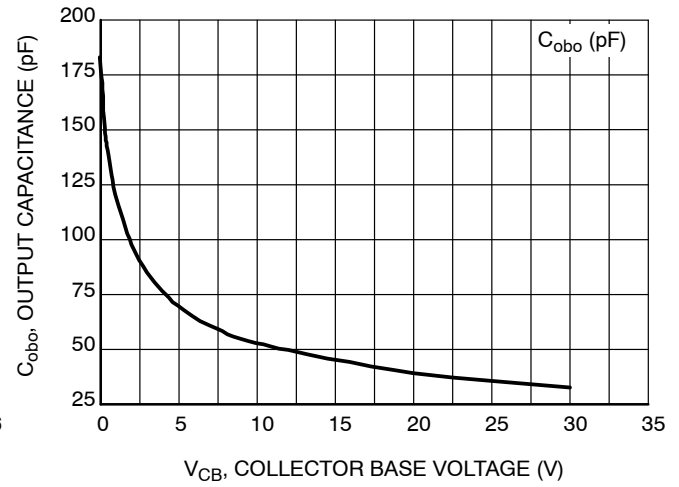


Figure 8. Output Capacitance

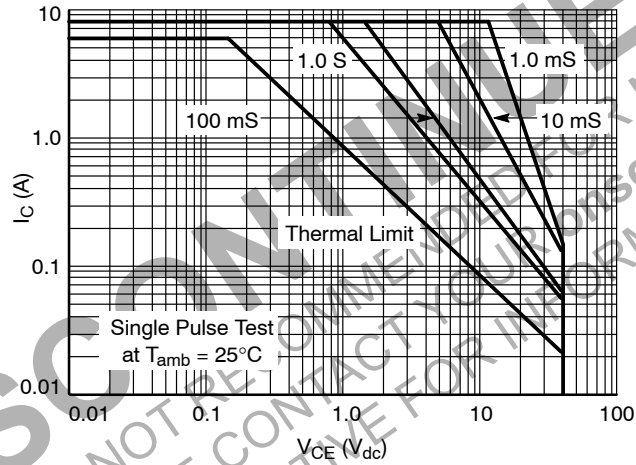
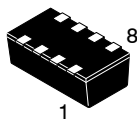
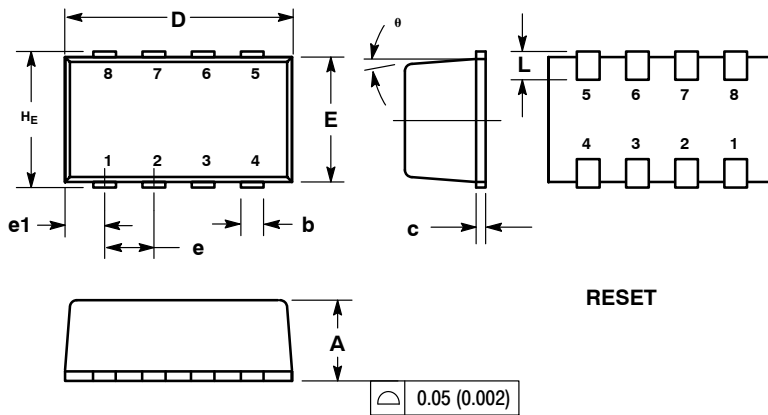


Figure 9. Safe Operating Area



SCALE 1:1



ChipFET™
CASE1206A-03
ISSUE K

DATE 19 MAY 2009

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MOLD GATE BURRS SHALL NOT EXCEED 0.13 MM PER SIDE.
4. LEADFRAME TO MOLDED BODY OFFSET IN HORIZONTAL AND VERTICAL SHALL NOT EXCEED 0.08 MM.
5. DIMENSIONS A AND B EXCLUSIVE OF MOLD GATE BURRS.
6. NO MOLD FLASH ALLOWED ON THE TOP AND BOTTOM LEAD SURFACE.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.00	1.05	1.10	0.039	0.041	0.043
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	1.55	1.65	1.70	0.061	0.065	0.067
e	0.65 BSC			0.025 BSC		
e1	0.55 BSC			0.022 BSC		
L	0.28	0.35	0.42	0.011	0.014	0.017
H_E	1.80	1.90	2.00	0.071	0.075	0.079
θ	5° NOM			5° NOM		

STYLE 1:

- PIN 1. DRAIN
2. DRAIN
3. DRAIN
4. GATE
5. SOURCE
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 2:

- PIN 1. SOURCE 1
2. GATE 1
3. SOURCE 2
4. GATE 2
5. DRAIN 2
6. DRAIN 2
7. DRAIN 1
8. DRAIN 1

STYLE 3:

- PIN 1. ANODE
2. ANODE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. CATHODE
8. CATHODE

STYLE 4:

- PIN 1. COLLECTOR
2. COLLECTOR
3. COLLECTOR
4. BASE
5. EMITTER
6. COLLECTOR
7. COLLECTOR
8. COLLECTOR

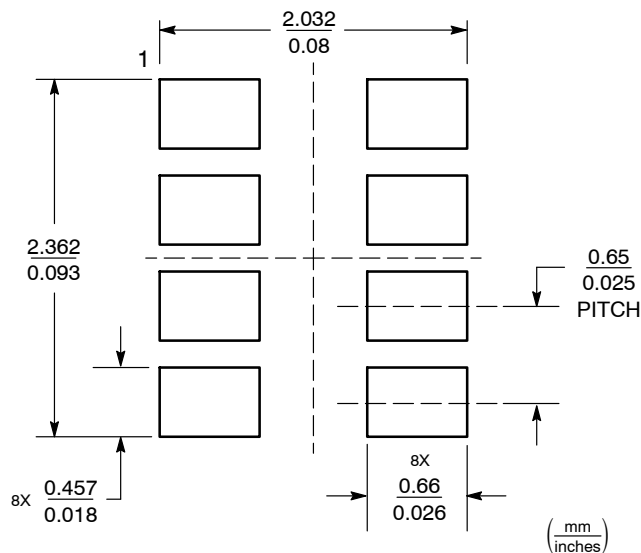
STYLE 5:

- PIN 1. ANODE
2. ANODE
3. DRAIN
4. DRAIN
5. SOURCE
6. GATE
7. CATHODE
8. CATHODE

STYLE 6:

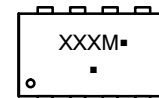
- PIN 1. ANODE
2. DRAIN
3. DRAIN
4. GATE
5. SOURCE
6. DRAIN
7. DRAIN
8. CATHODE / DRAIN

SOLDERING FOOTPRINT



Basic Style

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
M = Month Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

*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. Some products may not follow the Generic Marking.

OPTIONAL SOLDERING FOOTPRINTS ON PAGE 2

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DESCRIPTION:	ChipFET	PAGE 1 OF 2

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Figure 1: Dimensions of the test specimens. The diagram shows two types of specimens: 1X and 2X. The 1X specimen is a small square with dimensions 0.457 (width) and 0.018 (height). The 2X specimen is a larger square with dimensions 1.092 (width) and 0.043 (height). The 1X specimen is shown in a 4X arrangement, and the 2X specimen is shown in a 2X arrangement. The pitch between the specimens is 0.65 (width) and 0.025 (height). The overall dimensions of the test area are 2.032 (width) and 2.362 (height). The dimensions are given in inches, with a note indicating (mm/inches).

Figure 1: Dimensions of the test specimen. The diagram shows a rectangular specimen with various dimensions labeled in millimeters and inches. The overall width is 2.032 mm (0.08 inches). The top section has a width of 0.66 mm (0.026 inches) and a height of 1.092 mm (0.043 inches). The bottom section has a width of 1.118 mm (0.044 inches) and a height of 2.362 mm (0.093 inches). The total height is 3.454 mm (0.135 inches). The pitch of the top section is 0.65 mm (0.025 inches). The bottom section has a width of 0.457 mm (0.018 inches) and a height of 0.65 mm (0.025 inches).

Figure 1: Dimensions of the test specimen. The diagram shows a rectangular specimen with various dimensions labeled in inches and millimeters. The overall width is 2.032 inches (0.08 inches from the left edge to the center of the top hole, and 0.66 inches (2X 0.026 inches) for the hole diameter). The overall height is 2.362 inches (0.093 inches from the bottom edge to the center of the bottom hole, and 1.092 inches (0.043 inches) for the hole diameter). The bottom hole is 1.118 inches (0.044 inches) wide. The distance between the centers of the two holes is 0.65 inches (0.025 inches PITCH). The bottom hole is 0.457 inches (2X 0.018 inches) wide.

(mm / inches)

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

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