Bipolar Transistor

-160 V, -1.5 A, Low $V_{CE(sat)}$ PNP Single LFPAK

NST1601CL

This device is bipolar junction transistor featuring high current, low saturation voltage, and high speed switching.

Suitable for automotive applications. AEC−Q101 qualified and PPAP capable. (NSVT1601CLTWG)

Features

- Complement to NST1602CL
- Large Current Capacitance
- Low Collector to Emitter Saturation Voltage
- Thin Profile LFPAK8 3.3 x 3.3 mm Package
- High−Speed Switching
- High Allowable Power Dissipation
- AEC−Q101 Qualified and PPAP Capable (NSVT1601CLTWG)
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Load Switch
- Gate Driver Buffer
- DC−DC Converters

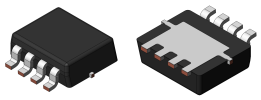
Specifications

ABSOLUTE MAXIMUM RATING at Ta = 25°C

Parameter	Symbol	Value	Unit
Collector to Base Voltage	V_{CBO}	−180	V
Collector to Emitter Voltage	V_{CEO}	−160	V
Emitter to Base Voltage	V_{EBO}	−6	V
Collector Current	I_C	−1.5	A
Collector Current (Pulse)	I_{CP}	−2.5	A
Collector Dissipation	P_C (Note 1)	0.8	W
	P_C (Note 2)	2.2	
Junction Temperature	Tj	175	°C
Storage Temperature	Tstg	−55 to +175	°C

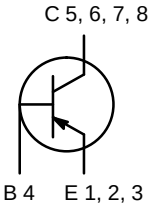
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Mounted on FRB with minimum pad of Copper 2 oz
2. Mounted on FRB with 1 in/sq pad of Copper 2 oz

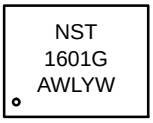


LFPAK8 3.3x3.3, 0.65P
CASE 760AD

ELECTRICAL CONNECTION



MARKING DIAGRAM



NST1601	= Specific Device Code
A	= Assembly Location
WL	= Wafer Lot
Y	= Year
W	= Work Week
G	= Pb−Free Package

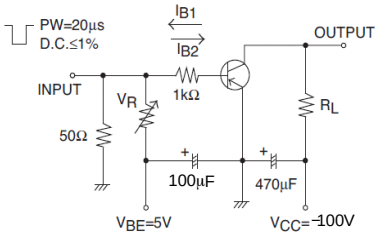
ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS at Ta = 25°C

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector Cutoff Current	ICBO	VCB = −180 V IE = 0 A	−	−	−0.1	μA
Emitter Cutoff Current	IEBO	VEB = −6 V IC = 0 A	−	−	−0.1	μA
DC Current Gain	hFE1	VCE = −5 V IC = −100 mA	140	−	280	
	hFE2	VCE = −5 V IC = −500 mA	130	−	−	
Gain−Bandwidth Product	fT	VCE = −10 V IC = −100 mA	−	87	−	MHz
Output Capacitance	Cob	VCB = −10 V f = 1 MHz	−	19	−	pF
Collector to Emitter Saturation Voltage	VCE(sat)1	IC = −250 mA IB = −25 mA	−	−0.08	−0.16	V
	VCE(sat)2	IC = −250 mA IB = −50 mA	−	−0.06	−0.12	V
	VCE(sat)3	IC = −500 mA IB = −50 mA	−	−0.1	−0.2	V
Base to Emitter Saturation Voltage	VBE(sat)	IC = −250 mA IB = −25 mA	−	−0.8	−1.2	V
Collector to Base Breakdown Voltage	V(BR)CBO	IC = −10 μA, IE = 0 A	−180	−	−	V
Collector to Emitter Breakdown Voltage	V(BR)CEO	IC = −1 mA, RBE = ∞	−160	−	−	V
Emitter to Base Breakdown Voltage	V(BR)EBO	IE = −10 μA, IC = 0 A	−6	−	−	V
Turn−On Time	t_{on}	See Figure 1	−	50	−	ns
Storage Time	t_{stg}		−	1150	−	ns
Fall Time	t_f		−	40	−	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.



IC=10|B1=−10|B2=−500mA

Figure 1. Switching Time Test Circuit

ESD RATING

Parameter	Symbol	Value	Unit	Class
Electrostatic Discharge −Human Body Model	HBM	>2000, <4000	V	Class 2
Electrostatic Discharge −Machine Model	MM	>400	V	Class M4

TYPICAL CHARACTERISTICS

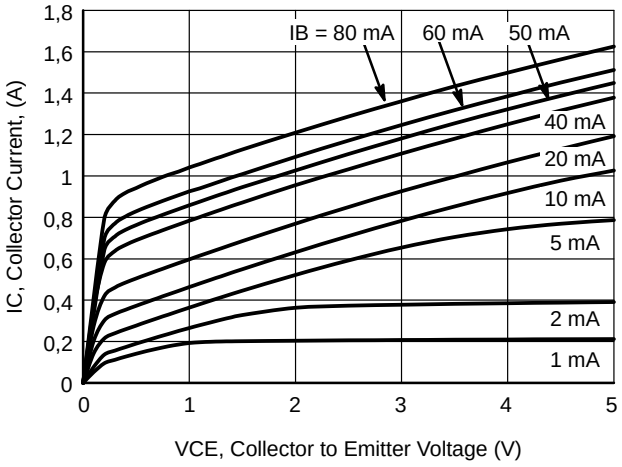


Figure 2. IC − VCE

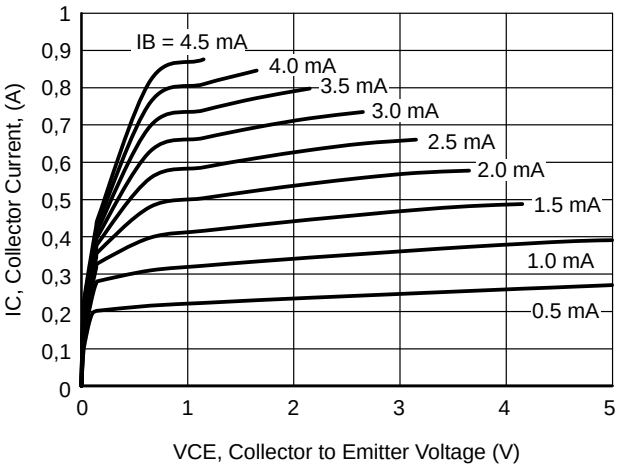


Figure 3. IC − VCE

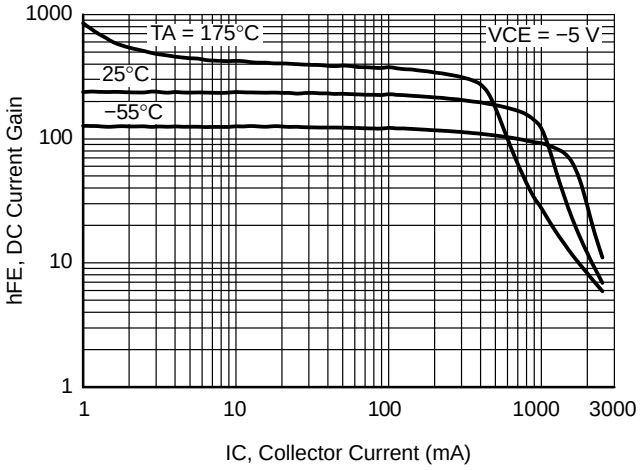


Figure 4. hFE − IC

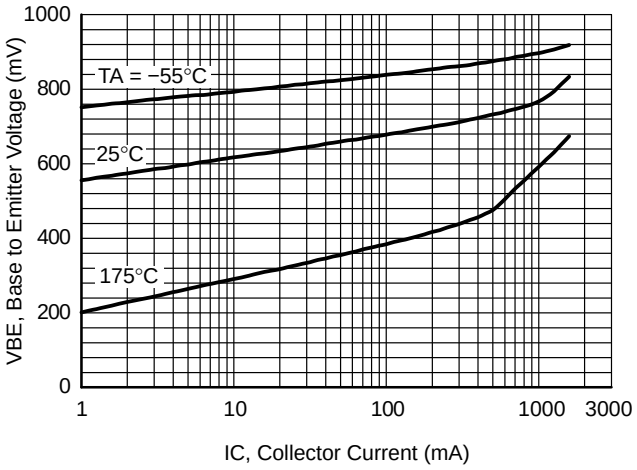


Figure 5. VBE − IC

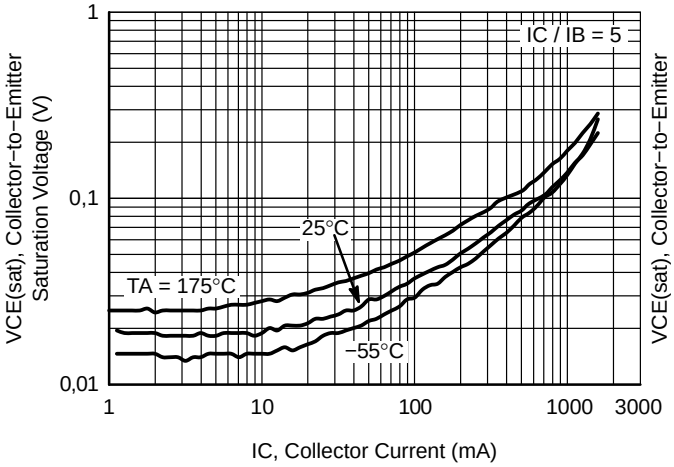


Figure 6. VCE(sat) − IC

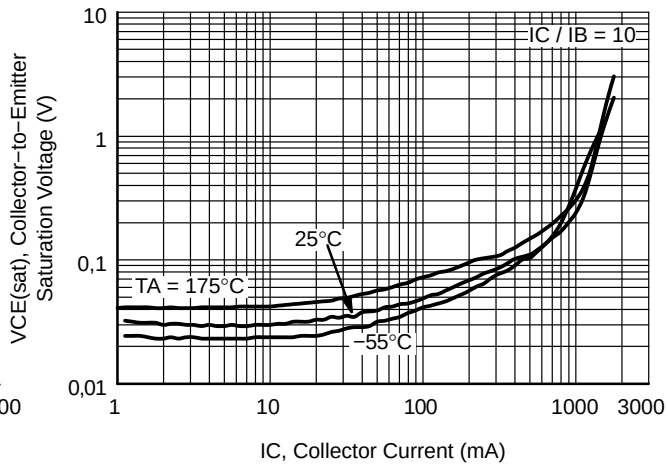


Figure 7. VCE(sat) − IC

TYPICAL CHARACTERISTICS

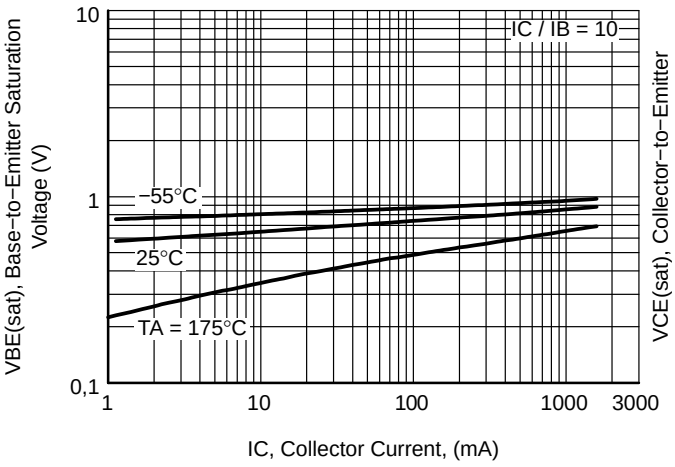


Figure 8. VBE(sat) − IC

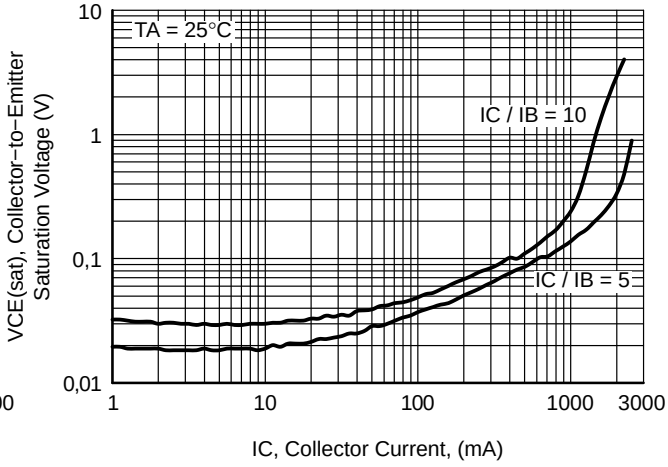


Figure 9. VCE(sat) − IC

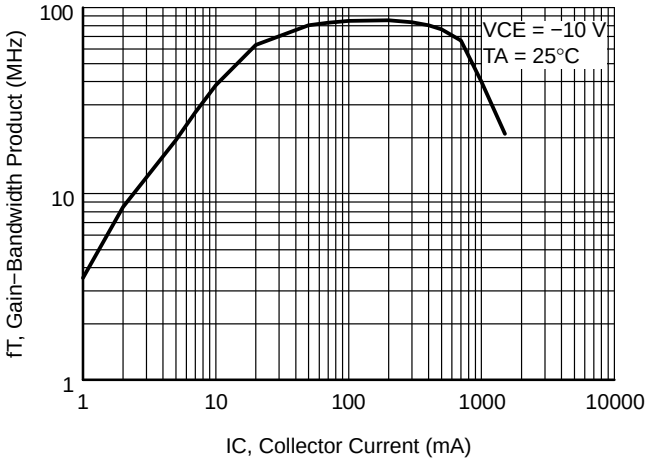


Figure 10. fT − IC

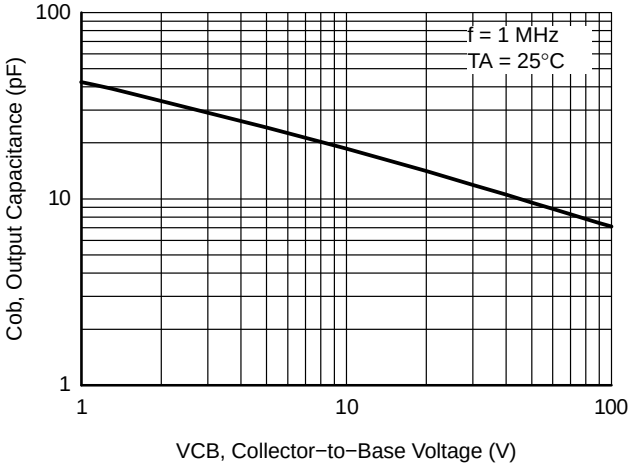


Figure 11. Cob − VCB

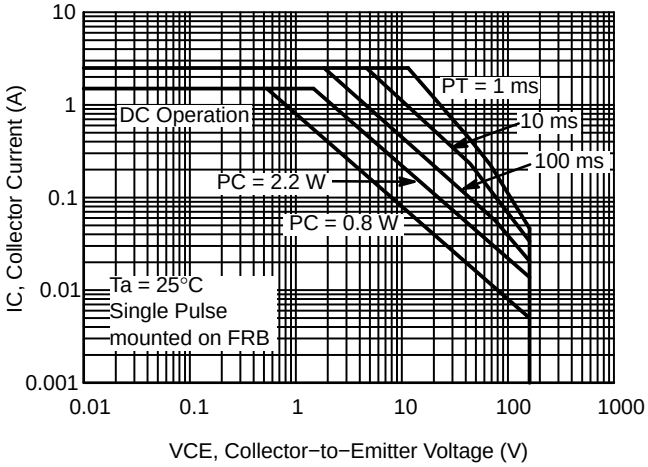


Figure 12. Safe Operating Area

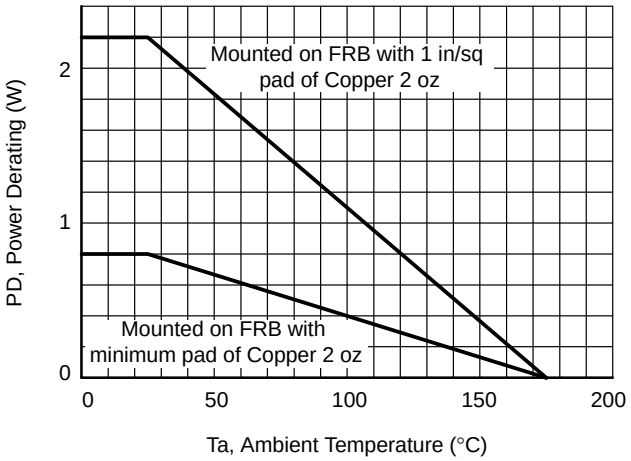
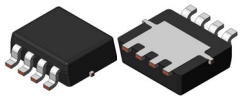


Figure 13. Power Derating

ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)†
NSVT1601CLTWG	NST1601G	LFPAK8 (Pb−Free / Halogen Free)	3,000 / Tape & Reel
NST1601CLTWG	NST1601G	LFPAK8 (Pb−Free / Halogen Free)	3,000 / 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



LFPAK8 3.3x3.3, 0.65P
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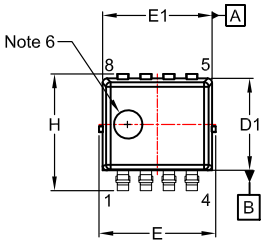
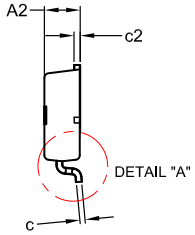
ISSUE E

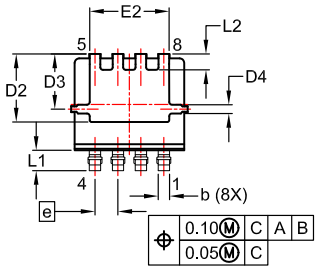
DATE 16 NOV 2020



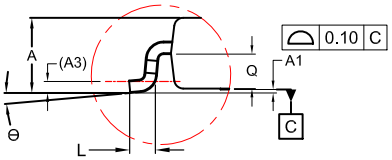
TOP VIEW



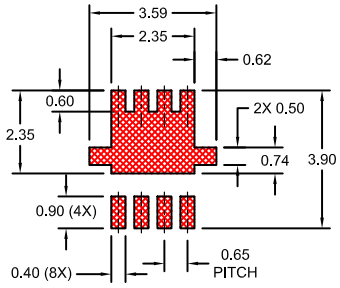
SIDE VIEW



BOTTOM VIEW



DETAIL 'A'
SCALE: 2:1



LAND PATTERN
RECOMMENDATION

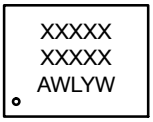
*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS OR BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
6. OPTIONAL MOLD FEATURE.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.95	1.05	1.15
A1	0.00	0.05	0.10
A2	0.95	1.00	1.05
A3		0.15 REF	
b	0.27	0.32	0.37
c	0.12	0.17	0.22
c2	0.12	0.17	0.22
D1	2.50	2.60	2.70
D2	1.82	1.92	2.02
D3	1.46	1.56	1.66
D4	0.20	0.25	0.30
E	3.20	3.30	3.40
E1	3.00	3.10	3.20
E2	2.15	2.25	2.35
e		0.65 BSC	
H	3.20	3.30	3.40
L	0.25	0.37	0.50
L1	0.48	0.58	0.68
L2	0.35	0.45	0.55
Q	0.45	0.50	0.55
θ	0°	4°	8°

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
W = Work Week

*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.

DOCUMENT NUMBER:	**98AON05544H**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**LFPAK8 3.3x3.3, 0.65P**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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