Dual General Purpose Transistor

The NST3904DP6T5G device is a spin-off of our popular SOT-23/SOT-323/SOT-563 three-leaded device. It is designed for general purpose amplifier applications and is housed in the SOT-963 six-leaded surface mount package. By putting two discrete devices in one package, this device is ideal for low-power surface mount applications where board space is at a premium.

Features

- h_{FE}, 100-300
- Low $V_{CE(sat)}$, $\leq 0.4 \text{ V}$
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- This is a Pb-Free Device

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Collector - Emitter Voltage		V _{CEO}	40	Vdc
Collector - Base Voltage		V _{CBO}	60	Vdc
Emitter - Base Voltage		V _{EBO}	6.0	Vdc
Collector Current - Continuous		I _C	200	mAdc
Electrostatic Discharge	HBM MM	ESD Class	2 B	

THERMAL CHARACTERISTICS

Characteristic (Single Heated)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C Derate above 25°C (Note 1)	P _D	240 1.9	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	520	°C/W
Total Device Dissipation T _A = 25°C Derate above 25°C (Note 2)	P _D	280 2.2	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	446	°C/W
Characteristic (Dual Heated) (Note 3)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C Derate above 25°C (Note 1)	P _D	350 2.8	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	357	°C/W
Total Device Dissipation T _A = 25°C Derate above 25°C (Note 2)	P _D	420 3.4	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	297	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C

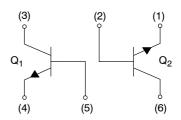
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- 1. FR-4 @ 100 mm², 1 oz. copper traces, still air.
- 2. FR-4 @ 500 mm², 1 oz. copper traces, still air.
- 3. Dual heated values assume total power is sum of two equally powered channels.



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NST3904DP6T5G



SOT-963 CASE 527AD PLASTIC

MARKING DIAGRAM



E = Device CodeM = Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]	
NST3904DP6T5G	SOT-963 (Pb-Free)	8000/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.

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

C	Symbol	Min	Max	Unit		
OFF CHARACTERISTICS		1		•	· •	
Collector - Emitter Breakdown Volta	V _{(BR)CEO}	40	-	Vdc		
Collector – Base Breakdown Voltage ($I_C = 10 \mu Adc, I_E = 0$) $V_{(BR)CBO}$				-	Vdc	
Emitter - Base Breakdown Voltage	nitter – Base Breakdown Voltage ($I_E = 10 \mu Adc, I_C = 0$) $V_{(BR)EBO}$ 6.0				Vdc	
Collector Cutoff Current (V _{CE} = 30	I _{CEX}	-	50	nAdc		
ON CHARACTERISTICS (Note 4)			•	•	•	
DC Current Gain $ \begin{aligned} &(I_C = 0.1 \text{ mAdc, V}_{CE} = 1.0 \text{ Vdc)} \\ &(I_C = 1.0 \text{ mAdc, V}_{CE} = 1.0 \text{ Vdc)} \\ &(I_C = 10 \text{ mAdc, V}_{CE} = 1.0 \text{ Vdc)} \\ &(I_C = 50 \text{ mAdc, V}_{CE} = 1.0 \text{ Vdc)} \\ &(I_C = 100 \text{ mAdc, V}_{CE} = 1.0 \text{ Vdc)} \end{aligned} $		h _{FE}	40 70 100 60 30	- 300 - -	-	
	C = 10 mAdc, I _B = 1.0 mAdc) -		0.2 0.3	Vdc		
Base – Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 50 mAdc, I _B = 5.0 mAdc)		V _{BE(sat)}	0.65 -	0.85 0.95	Vdc	
SMALL-SIGNAL CHARACTERIS	TICS				•	
Current - Gain - Bandwidth Produc	ct (I _C = 10 mAdc, V _{CE} = 20 Vdc, f = 100 MHz)	f _T	200	_	MHz	
Output Capacitance (V _{CB} = 5.0 Vd	C _{obo}	-	4.0	pF		
Input Capacitance (V _{EB} = 0.5 Vdc,	C _{ibo}	-	8.0	pF		
Noise Figure (V _{CE} = 5.0 Vdc, I _C =	NF	-	5.0	dB		
SWITCHING CHARACTERISTICS	3	•				
Delay Time	$(V_{CC} = 3.0 \text{ Vdc}, V_{BE} = -0.5 \text{ Vdc})$	t _d	_	35		
Rise Time	(I _C = 10 mAdc, I _{B1} = 1.0 mAdc)	t _r	-	35	ns	
Storage Time	$(V_{CC} = 3.0 \text{ Vdc}, I_C = 10 \text{ mAdc})$	t _s – 275		275		
Fall Time	(I _{B1} = I _{B2} = 1.0 mAdc)	t _f	_	50	ns	

^{4.} Pulse Test: Pulse Width \leq 300 μ s; Duty Cycle \leq 2.0%.

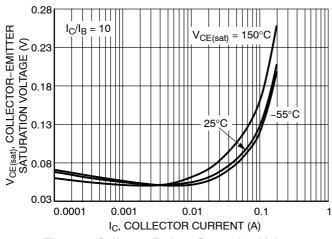


Figure 1. Collector Emitter Saturation Voltage vs.
Collector Current

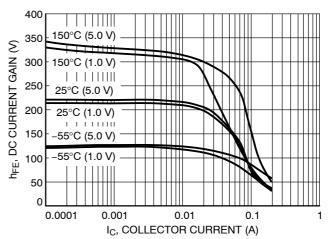


Figure 2. DC Current Gain vs. Collector Current

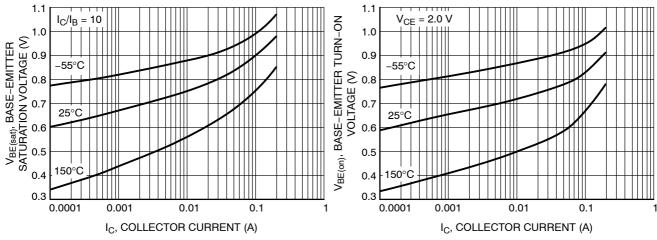


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

Figure 4. Base Emitter Turn-On Voltage vs.
Collector Current

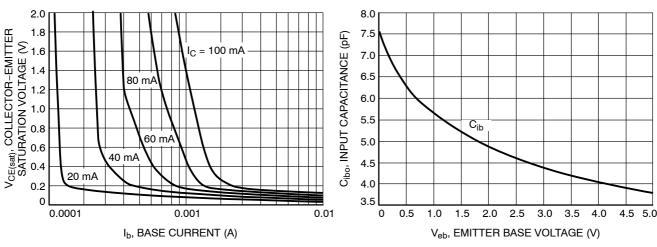


Figure 5. Saturation Region

Figure 6. Input Capacitance

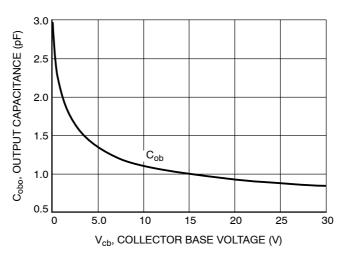
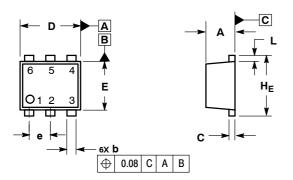


Figure 7. Output Capacitance

PACKAGE DIMENSIONS

SOT-963 CASE 527AD-01 ISSUE B

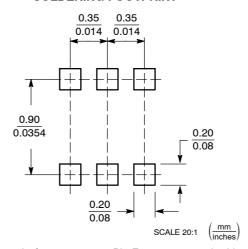


NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI
 Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: MILLIMETERS
- 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α	0.34	0.37	0.40				
b	0.10	0.15	0.20	0.004	0.006	0.008	
С	0.07	0.12	0.17	0.003	0.005	0.007	
D	0.95	1.00	1.05	0.037	0.039	0.041	
E	0.75	0.80	0.85	0.03	0.032	0.034	
е	0.35 BSC			(0.014 BS	C	
L	0.05	0.10	0.15	0.002	0.004	0.006	
Hε	0.95	1.00	1.05	0.037	0.039	0.041	

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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