



DUAL SURFACE MOUNT NPN TRANSISTORS

This device contains two electrically-isolated 2N3904 NPN transistors. The two transistors have well matched hFE and are encapsulated in an ultra-small SOT-363 (SC70-6L) package. This device is ideal for portable applications where board space is at a premium.

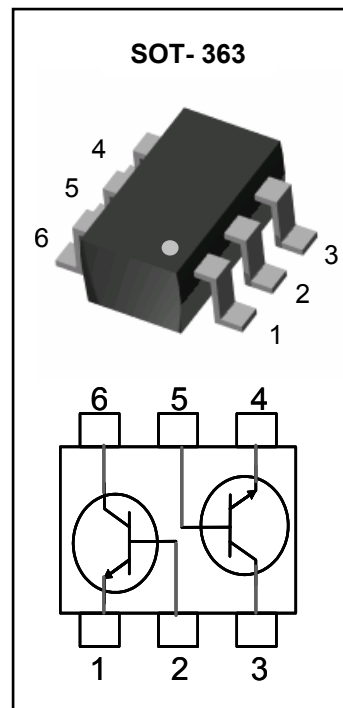
FEATURES

- Electrically Isolated Dual NPN Switching Transistor
- Lead-Free Plating (100% matte tin finish)

APPLICATIONS

- General Purpose Amplifier Applications
- Hand-Held Computers, PDAs

Device Marking Code: S1A



MAXIMUM RATINGS

$T_J = 25^{\circ}\text{C}$ Unless otherwise noted

Rating	Symbol	Value	Units
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EB}	6.0	V
Collector Current	I_C	200	mA
Total Power Dissipation (Note 1)	P_D	200	mW
Operating Junction Temperature Range	T_J	-55 to +150	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Units
Thermal Resistance, Junction to Ambient (Note 1)	R_{thja}	625	$^{\circ}\text{C/W}$

Note 1. FR-5 board 1.0 x 0.75 x 0.062 inch with minimum recommended pad layout

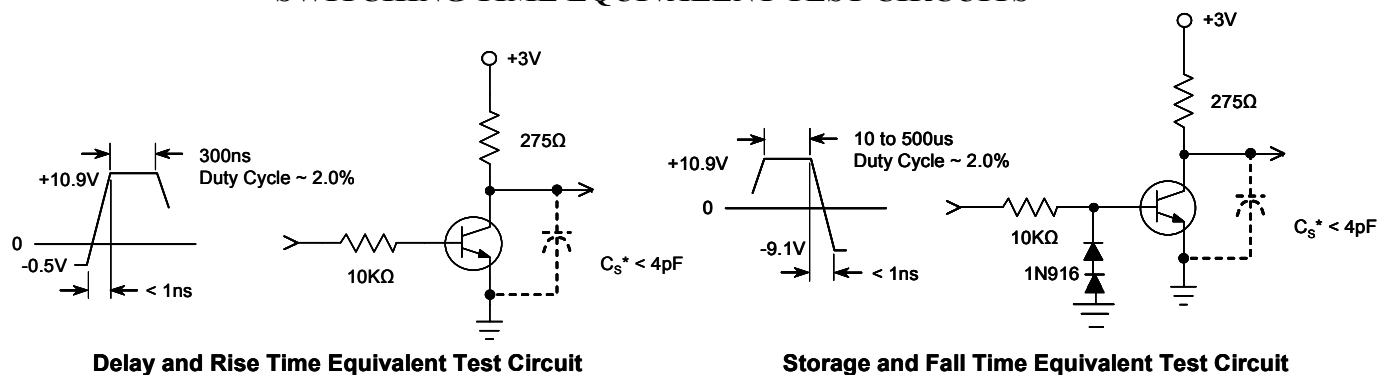


ELECTRICAL CHARACTERISTICS (Each Transistor) $T_J = 25^\circ\text{C}$ Unless otherwise noted

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1.0\text{mA}$	40	-	-	V
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}$	60	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$	6.0	-	-	V
Collector Cutoff Current	I_{CEX}	$V_{CE} = 30\text{V}, V_{EB} = 3.0\text{V}$	-	-	50	nA
Base Cutoff Current	I_{BL}	$V_{CE} = 30\text{V}, V_{EB} = 3.0\text{V}$	-	-	50	nA
DC Current Gain (Note 2)	h_{FE}	$I_C = 0.1\text{mA}, V_{CE} = 1.0\text{V}$	40	-	-	-
		$I_C = 1.0\text{mA}, V_{CE} = 1.0\text{V}$	70	-	-	
		$I_C = 10\text{mA}, V_{CE} = 1.0\text{V}$	100	-	300	
		$I_C = 50\text{mA}, V_{CE} = 1.0\text{V}$	60	-	-	
		$I_C = 100\text{mA}, V_{CE} = 1.0\text{V}$	30	-	-	
Collector-Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$	-	-	0.2	V
		$I_C = 50\text{mA}, I_B = 5.0\text{mA}$	-	-	0.3	V
Base-Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$	0.65	-	0.85	V
		$I_C = 50\text{mA}, I_B = 5.0\text{mA}$	-	-	0.95	
Gain-Bandwidth Product	f_T	$V_{CE} = 20\text{V}, I_C = 10\text{mA}$ $f = 100\text{MHz}$	300	-	-	MHz
Collector-Base Capacitance	C_{CBO}	$V_{CB} = 5.0\text{V}, f = 1.0\text{MHz}$	-	-	4.0	pF
Emitter-Base Capacitance	C_{EBO}	$V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}$	-	-	8.0	pF
Delay Time	t_d	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}$ $V_{BE(off)} = -0.5\text{V}, I_{B1} = -1.0\text{mA}$	-	-	35	ns
Rise Time	t_r		-	-	35	ns
Storage Time	t_s	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}$ $I_{B1} = I_{B2} = 1.0\text{mA}$	-	-	200	ns
Fall Time	t_f		-	-	50	ns

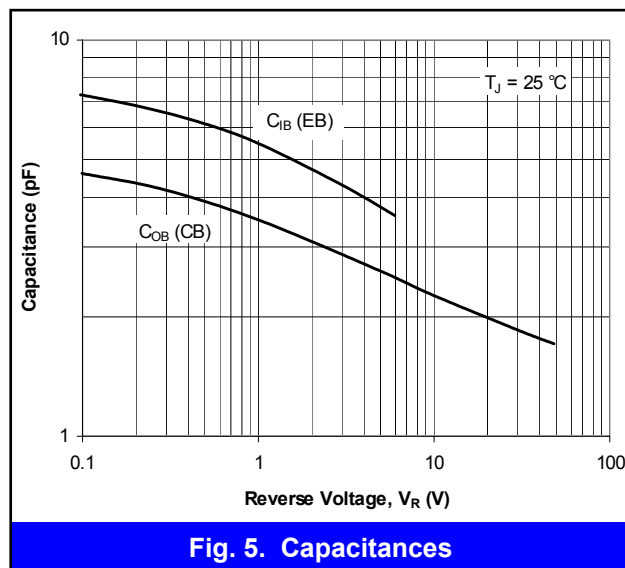
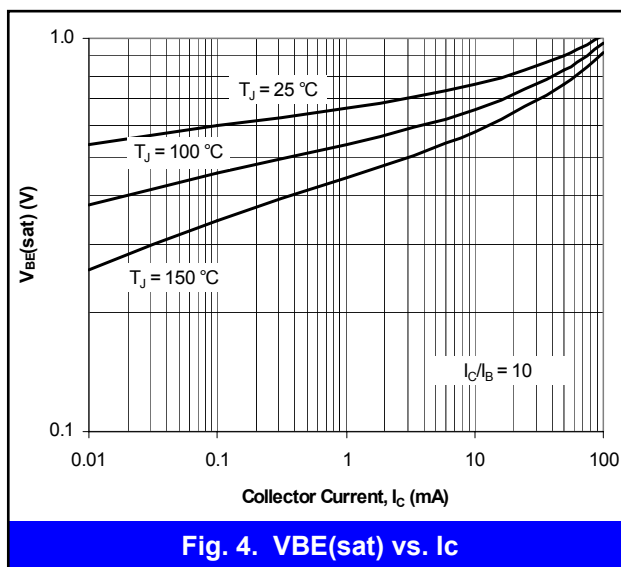
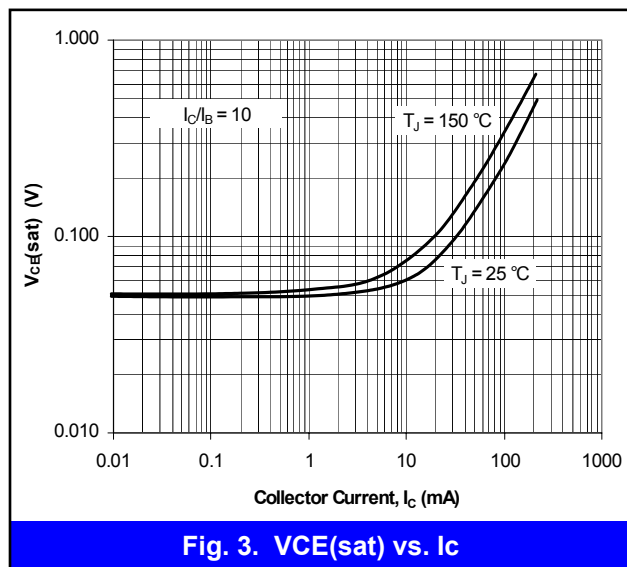
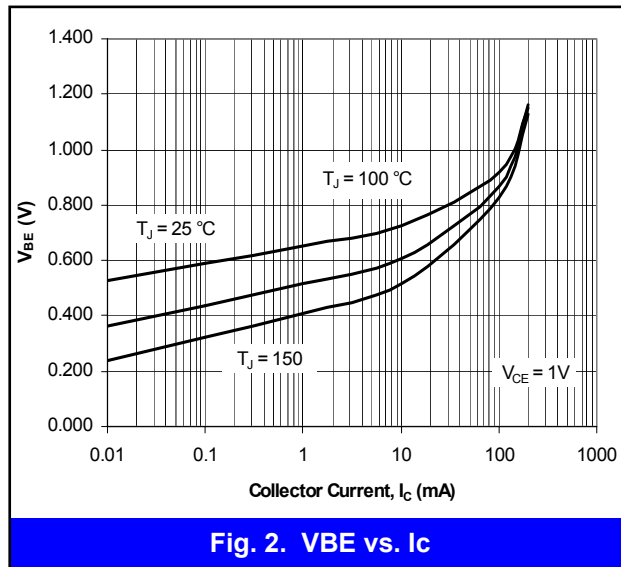
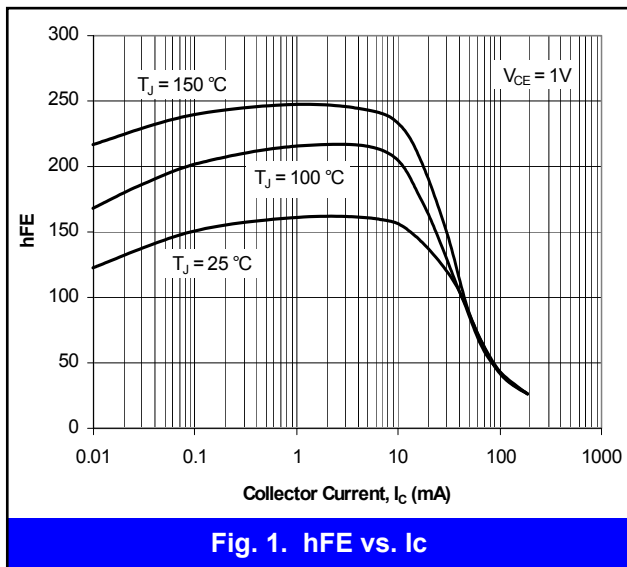
Note 2. Short duration test pulse used to minimize self-heating

SWITCHING TIME EQUIVALENT TEST CIRCUITS



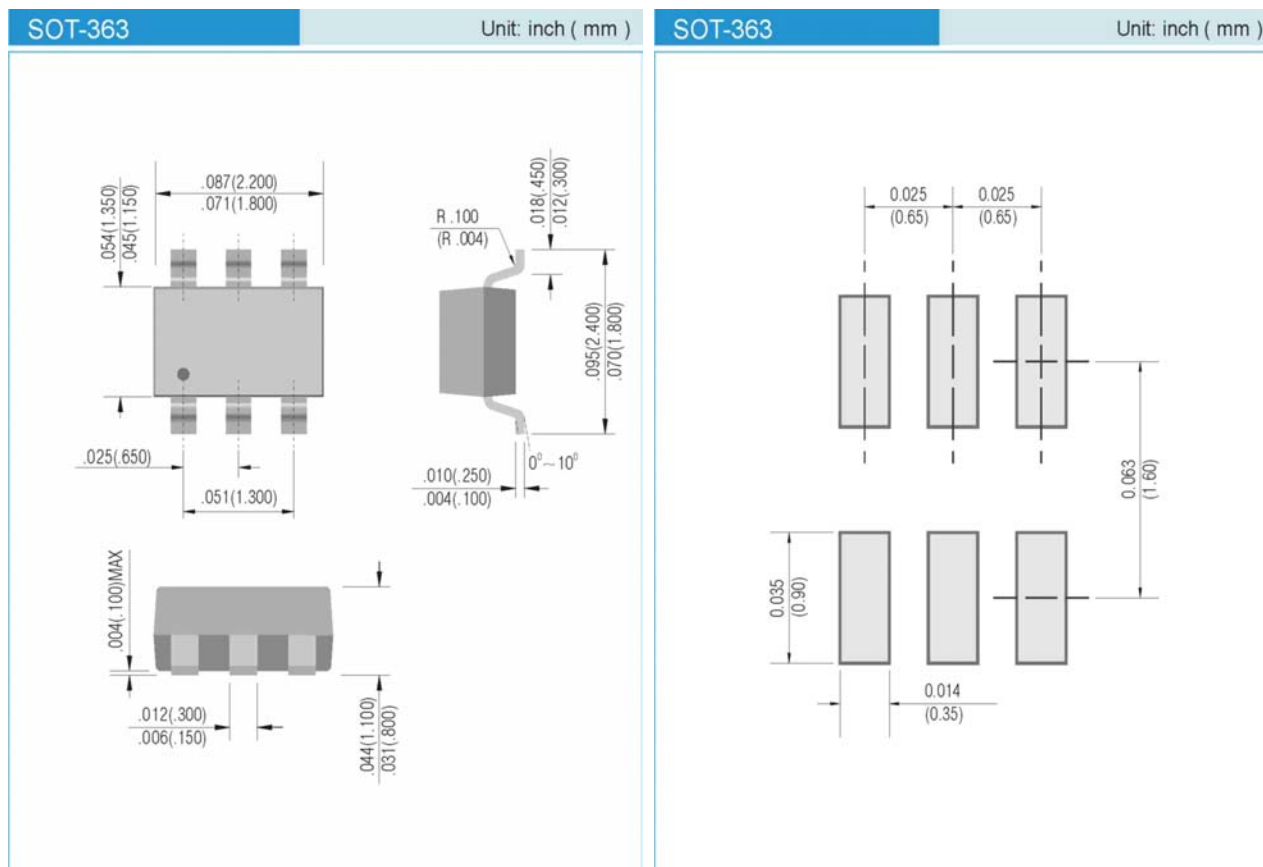


CHARACTERISTICS CURVES (Each Transistor) $T_J = 25^\circ\text{C}$ Unless otherwise noted





PACKAGE LAYOUT AND SUGGESTED PAD DIMENSIONS



ORDERING INFORMATION

MMDT3904 T/R7 - 3,000 units per 7 inch reel

MMDT3904 T/R13 -10,000 units per 13 inch reel

Copyright PanJit International, Inc 2005

The information presented in this document is believed to be accurate and reliable. The specifications and information herein are subject to change without notice. Pan Jit makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. Pan Jit products are not authorized for use in life support devices or systems. Pan Jit does not convey any license under its patent rights or rights of others.