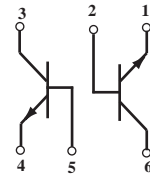


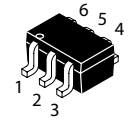
Dual General Purpose Transistors

NPN+NPN Silicon

 Lead(Pb)-Free



NPN+NPN



SOT-363(SC-88)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	75	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current-Continuous	I_C	600	mAdc

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Total Device Dissipation (1) $T_A=25^\circ\text{C}$	P_D	150	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Junction and Storage, Temperature	T_J, T_{stg}	-55 to+150	$^\circ\text{C}$

DEVICE MARKING

MBT2222ADW=XX

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C=10\text{ mAdc}, I_E=0$)	$V_{(BR)CEO}$	40	-	Vdc
Collector-Base Breakdown Voltage ($I_C=10\text{ }\mu\text{Adc}, I_E=0$)	$V_{(BR)CBO}$	75	-	Vdc
Emitter-Base Breakdown Voltage ($I_E=10\text{ }\mu\text{Adc}, I_C=0$)	$V_{(BR)EBO}$	6.0	-	Vdc
Collector Cutoff Current ($V_{CE}=60\text{ Vdc}, V_{EB(off)}=3.0\text{ Vdc}$)	I_{CEX}	-	10	nAdc
Collector Cutoff Current ($V_{CB}=60\text{ Vdc}, I_E=0$) ($V_{CB}=60\text{ Vdc}, I_E=0, T_A=125^\circ\text{C}$)	I_{CBO}	-	0.01 10	μAdc
Emitter Cutoff Current ($V_{EB}=3.0\text{ Vdc}, I_C=0$)	I_{EBO}	-	100	nAdc
Base Cutoff Current ($V_{CE}=60\text{ Vdc}, V_{EB(off)}=3.0\text{ Vdc}$)	I_{BL}	-	20	nAdc

1. Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint

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

Characteristics	Symbol	Min	Max	Unit
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DC CHARACTERISTICS

DC Current Gain ($I_C=0.1\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$) ($I_C=1.0\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$) ($I_C=10\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $T_A=-55^\circ\text{C}$) ($I_C=150\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$) ⁽²⁾ ($I_C=150\text{ mAdc}$, $V_{CE}=1.0\text{ Vdc}$) ⁽²⁾ ($I_C=500\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$) ⁽²⁾	h_{FE}	35 50 75 100	- - - 300	-
Collector-Emitter Saturation Voltage ⁽²⁾ ($I_C=150\text{ mAdc}$, $I_B=15\text{ mAdc}$) ($I_C=500\text{ mAdc}$, $I_B=50\text{ mAdc}$)	$V_{CE(sat)}$	- -	0.3 1.0	Vdc
Base-Emitter Saturation Voltage ⁽²⁾ ($I_C=150\text{ mAdc}$, $I_B=15\text{ mAdc}$) ($I_C=500\text{ mAdc}$, $I_B=50\text{ mAdc}$)	$V_{BE(sat)}$	0.6 -	1.2 2.0	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain-Bandwidth Product ⁽³⁾ ($I_C=20\text{ mAdc}$, $V_{CE}=20\text{ Vdc}$, $f=100\text{ MHz}$)	f_T	300	-	MHz
Output Capacitance ($V_{CB}=10\text{ Vdc}$, $I_E=0$, $f=1.0\text{ MHz}$)	C_{obo}	-	8.0	pF
Input Capacitance ($V_{EB}=0.5\text{ Vdc}$, $I_C=0$, $f=1.0\text{ MHz}$)	C_{ibo}	-	25	pF
Input Impedance ($I_C=1.0\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$) ($I_C=10\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$)	h_{ie}	2.0 0.25	0.8 1.25	$k\Omega$
Voltage Feedback Ratio ($I_C=1.0\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$) ($I_C=10\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$)	h_{re}	-	8.0 4.0	$\times 10^{-4}$
Small-Signal Current Gain ($I_C=1.0\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$) ($I_C=10\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$)	h_{fe}	50 75	300 375	-
Output Admittance ($I_C=1.0\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$) ($I_C=10\text{ mAdc}$, $V_{CE}=10\text{ Vdc}$, $f=1.0\text{ kHz}$)	h_{oe}	5.0 25	35 200	μmhos
Collector Base Time Constant ($I_E=20\text{ mAdc}$, $V_{CB}=20\text{ Vdc}$, $f=31.8\text{ MHz}$)	r_b, C_c	-	150	ps
Noise Figure ($I_C=100\text{ }\mu\text{A}$, $V_{CE}=10\text{ Vdc}$, $R_S=1.0k\Omega$, $f=1.0\text{ kHz}$)	NF	-	4.0	dB

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

Characteristics	Symbol	Min	Max	Unit
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SWITCHING CHARACTERISTICS

Delay Time	$(V_{CC}=30\text{ Vdc}, V_{BE}(\text{off})=-0.5\text{Vdc}, I_C=150\text{ mAdc}, I_{B1}=15\text{ mAdc})$	t_d	-	10	ns
Rise Time		t_r	-	25	
Storage Time	$(V_{CC}=30\text{ Vdc}, I_C=150\text{ mAdc}, I_{B1}=I_{B2}=15\text{ mAdc})$	t_s	-	225	ns
Fall Time		t_f	-	60	

2. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

3. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

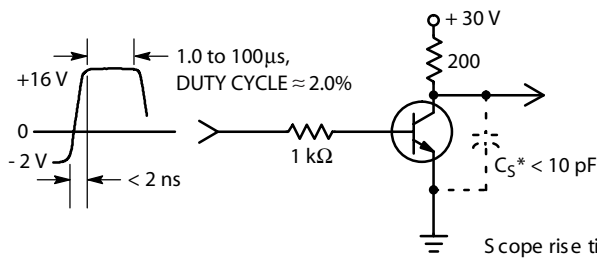


Figure 1. Turn-On Time

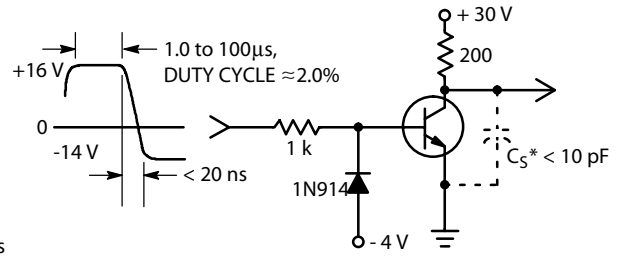


Figure 2. Turn-Off Time

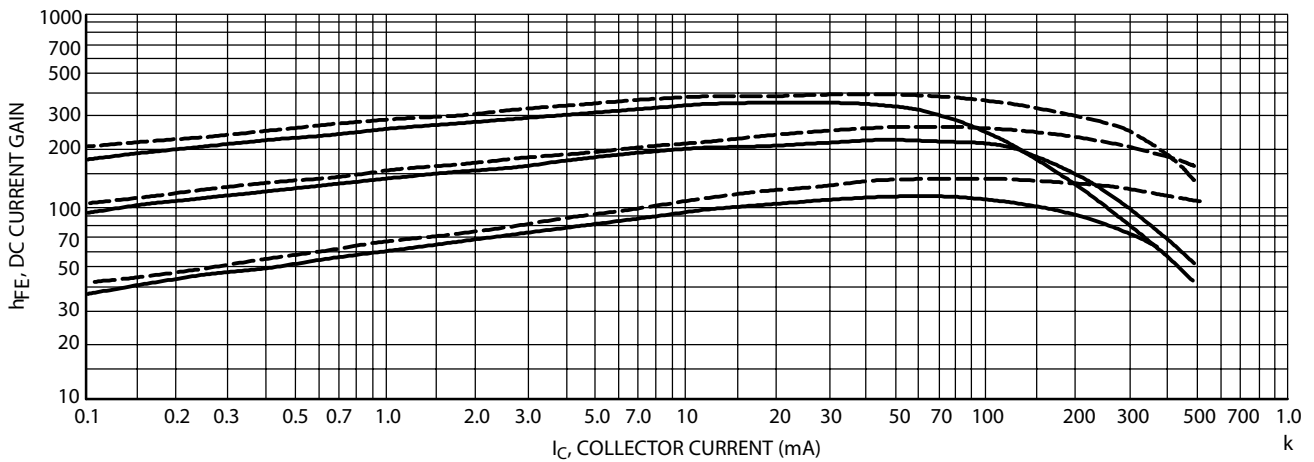


Figure 3. DC Current Gain

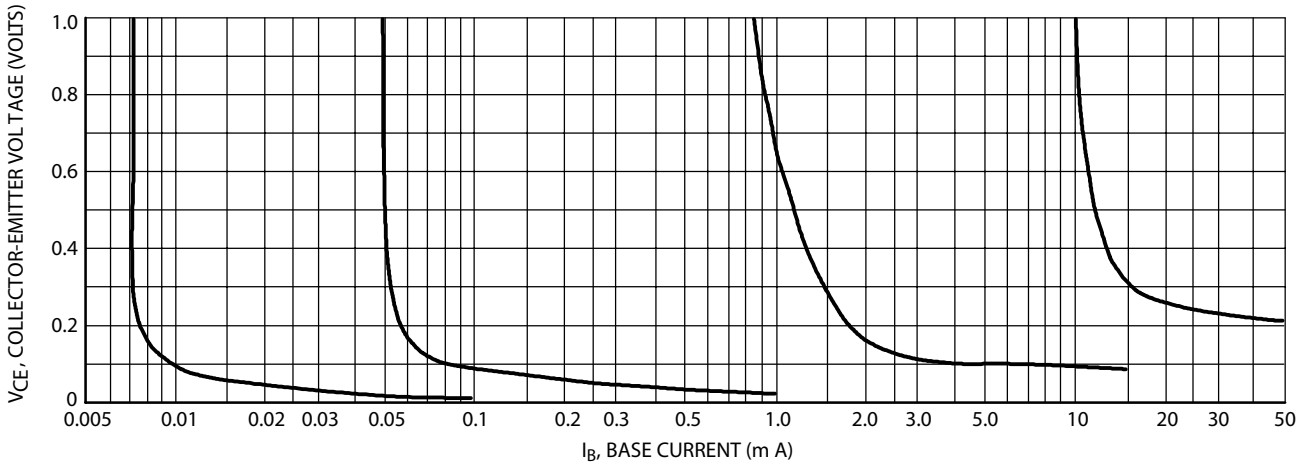


Figure 4. Collector Saturation Region

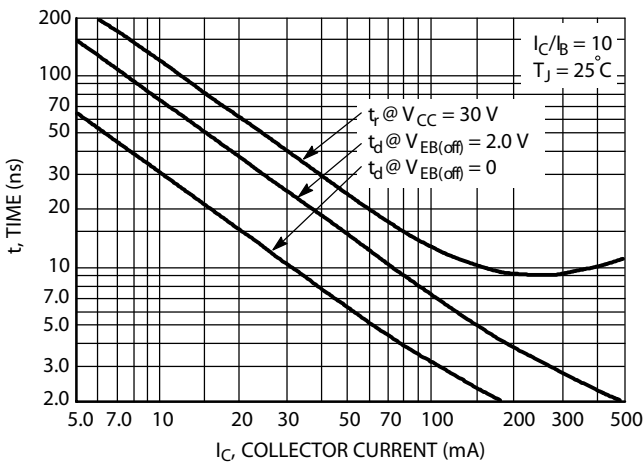


Figure 5. Turn-On Time

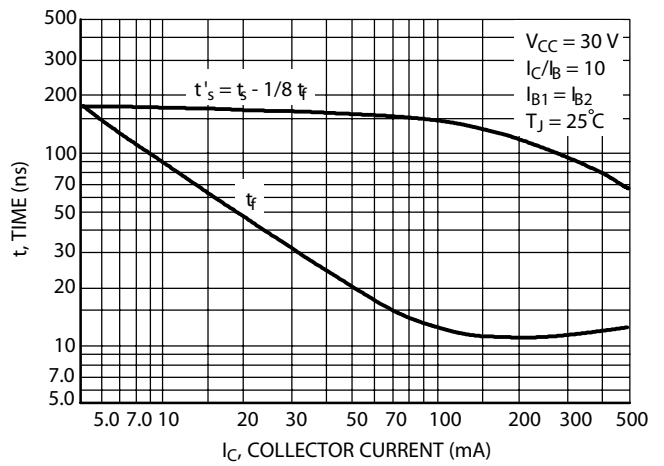


Figure 6. Turn-Off Time

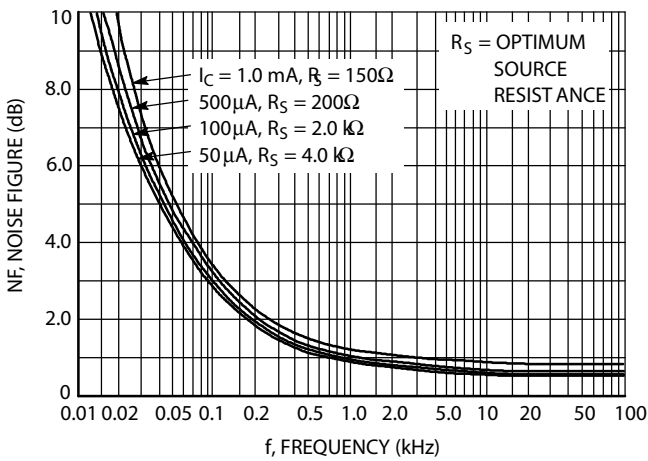


Figure 7. Frequency Effects

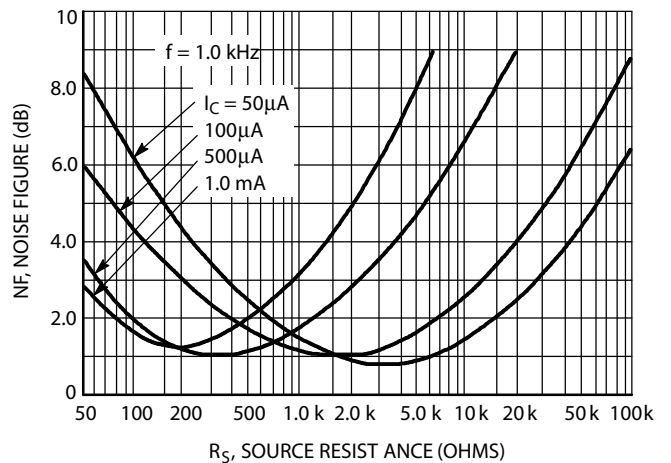


Figure 8. Source Resistance Effects

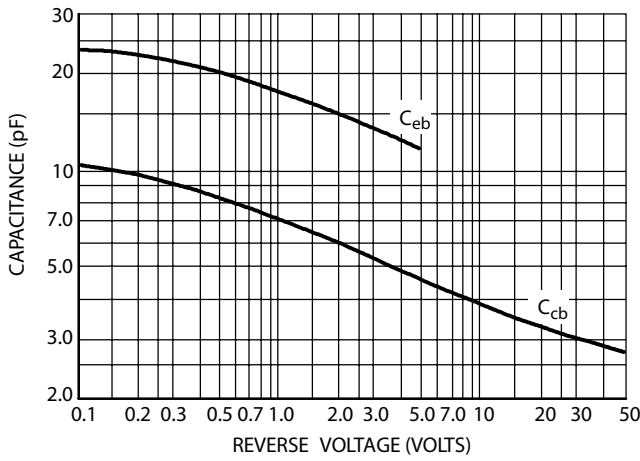


Figure 9. Capacitances

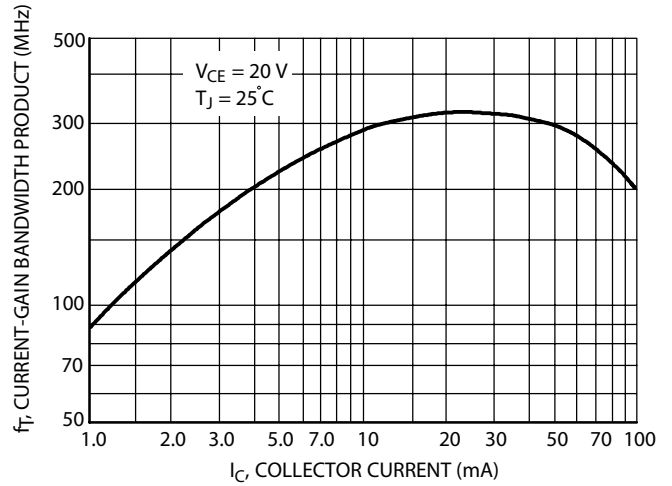


Figure 10. Current Gain Bandwidth Product

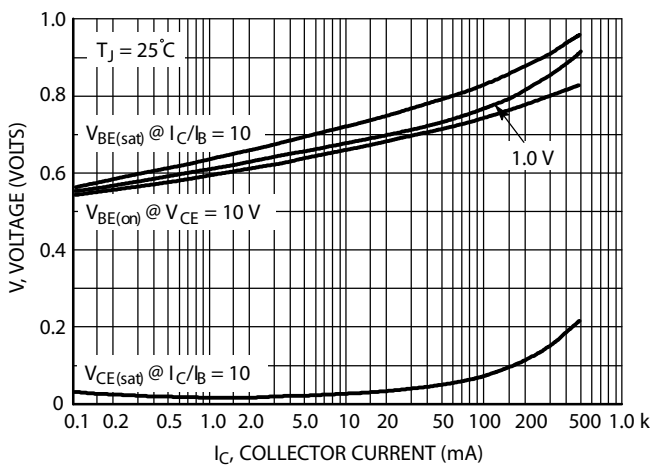


Figure 11. "On" Voltages

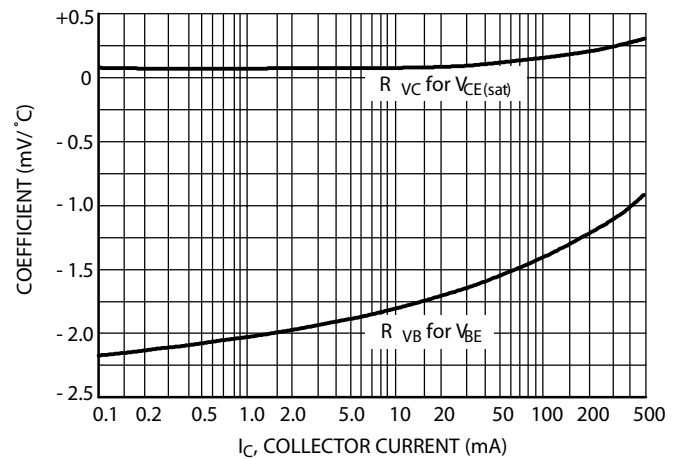
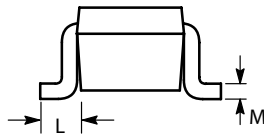
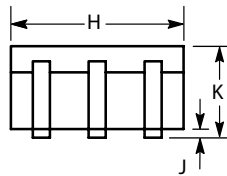
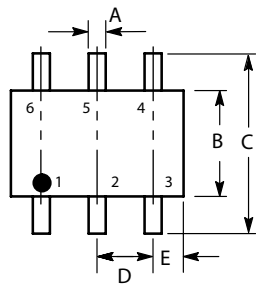


Figure 12. Temperature Coefficients

SOT-363 Package Outline Dimensions

Unit:mm



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 REF	
E	0.30	0.40
H	1.80	2.20
J	-	0.10
K	0.80	1.10
L	0.25	0.40
M	0.10	0.25