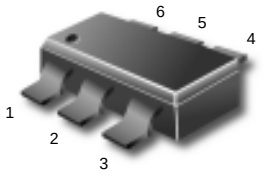
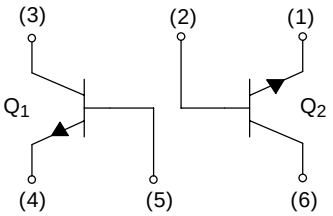
Dual General Purpose Switching Transistors

NPN Silicon

We declare that material of product compliance with ROHS requirements.



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

Characteristic	Symbol	Max	Unit
Total Package Dissipation (Note 1) T_A = 25℃	P_D	150	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	833	℃/W
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	℃

ORDERING INFORMATION

Device	Marking	Shipping
FFB2222AD	XX or 1P	3000/Tape & Reel

ELECTRICAL CHARACTERISTICS (Ta=25℃ unless otherwise noted)

Characteristic	Symbol	Min	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 = 10μAdc, I_E = 0)	$V_{(BR)CBO}$	75	–	Vdc
Emitter – Base Breakdown Voltage (I_E = 10μAdc, I_C = 0)	$V_{(BR)EBO}$	6.0	–	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	I_{CEX}	–	10	nAdc
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 60 Vdc, I_E = 0, T_A = 125 ℃)	I_{CBO}	 – –	 0.01 10	μAdc
Emitter Cutoff Current (V_{EB} = 3.0 Vdc, I_C = 0)	I_{EBO}	–	100	nAdc
Base Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	I_{BL}	–	20	nAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 0.1 mAdc, V_{CE} = 10 Vdc) (I_C = 1.0 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = –55°C) (I_C = 150 mAdc, V_{CE} = 10 Vdc) (Note 2) (I_C = 150 mAdc, V_{CE} = 1.0 Vdc) (Note 2) (I_C = 500 mAdc, V_{CE} = 10 Vdc) (Note 2)	h_{FE}	 35 50 75 35 100 50 40	 – – – – 300 – –	–
Collector – Emitter Saturation Voltage (Note 2) (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{CE(sat)}$	 – –	 0.3 1.0	Vdc
Base–Emitter Saturation Voltage (Note 2) (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{BE(sat)}$	 0.6 –	 1.2 2.0	Vdc

2. Pulse Test: Pulse Width≤ 300us, Duty Cycle ≤ 2.0%.

SMALL–SIGNAL CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

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

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

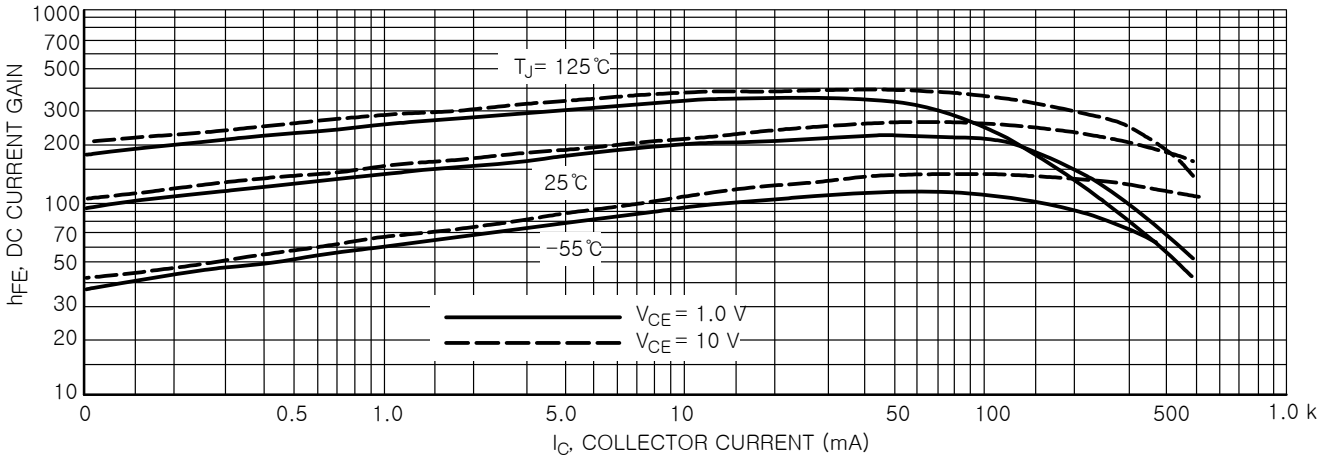


Figure 1. DC Current Gain

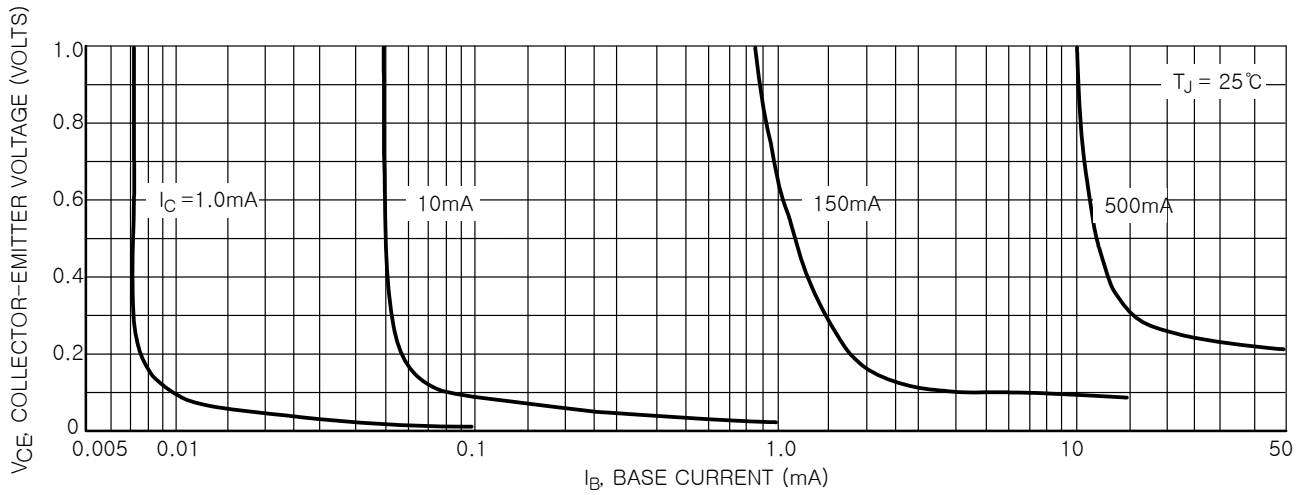


Figure 2. Collector Saturation Region

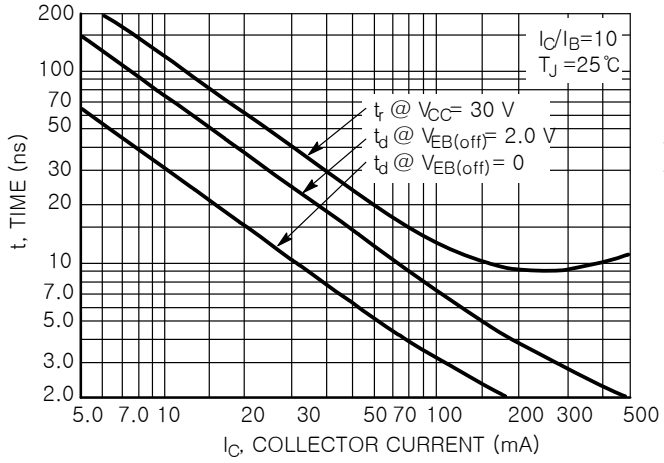


Figure 3. Turn−On Time

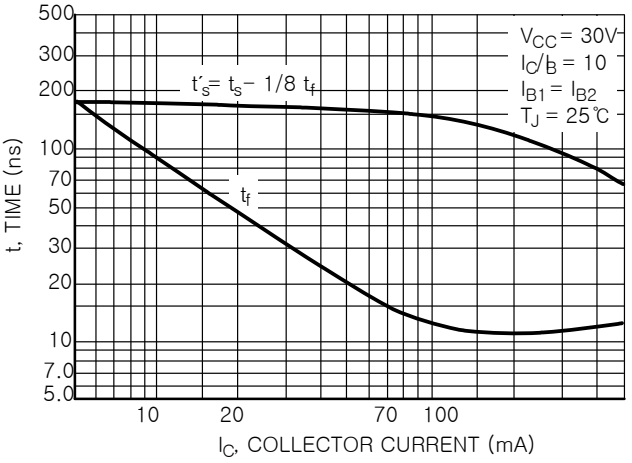


Figure 4. Turn−Off Time

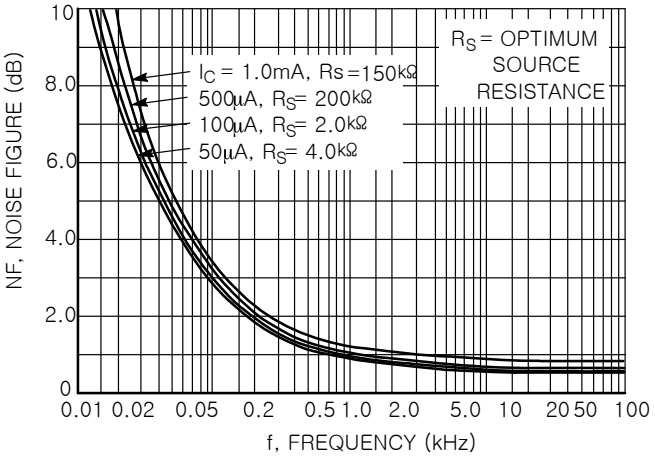


Figure 5. Frequency Effects

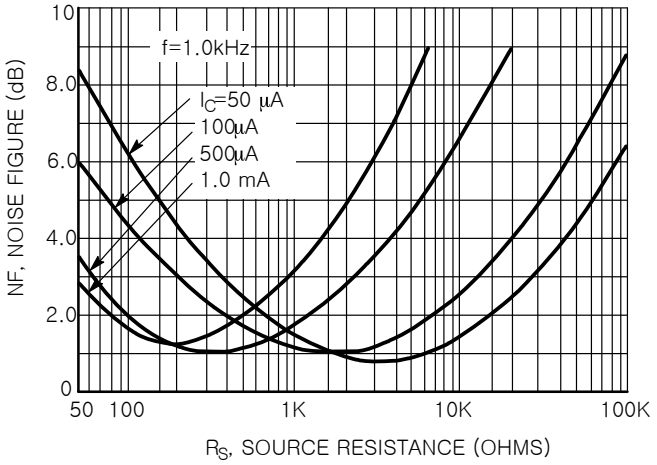


Figure 6. Source Resistance Effects

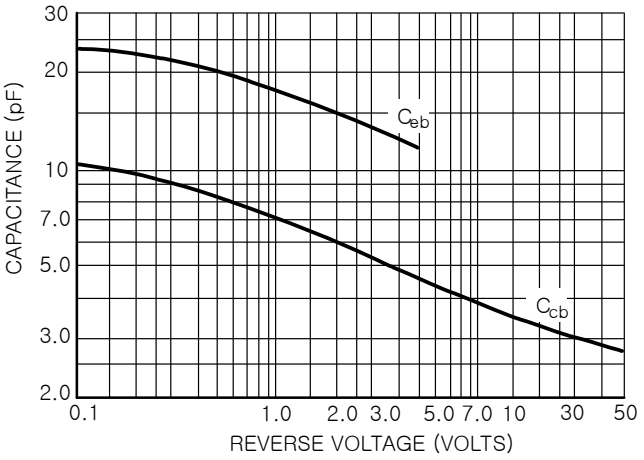


Figure 7. Capacitances

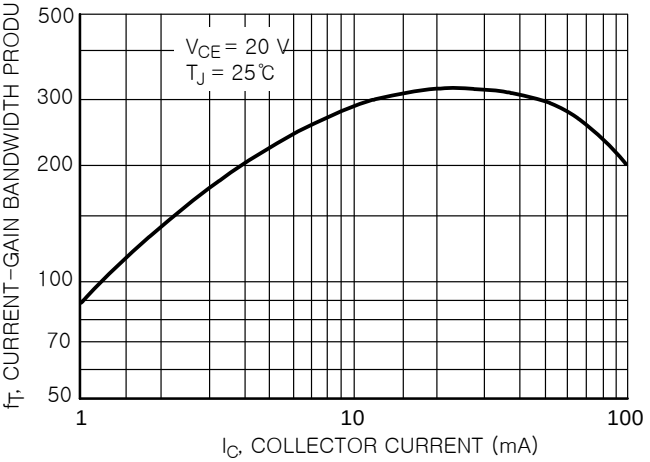


Figure 8. Current–Gain Bandwidth Product

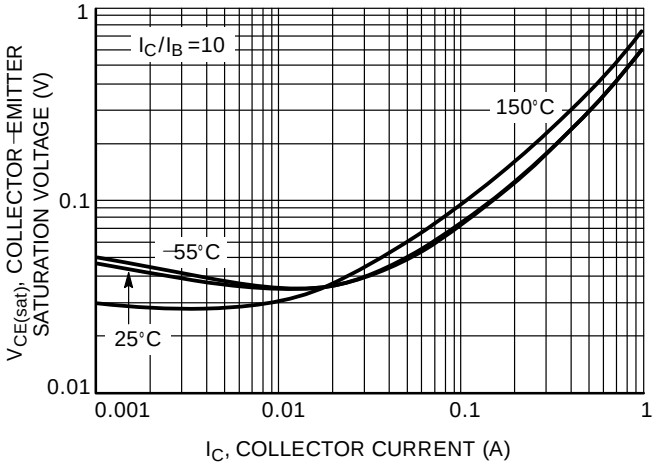


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current

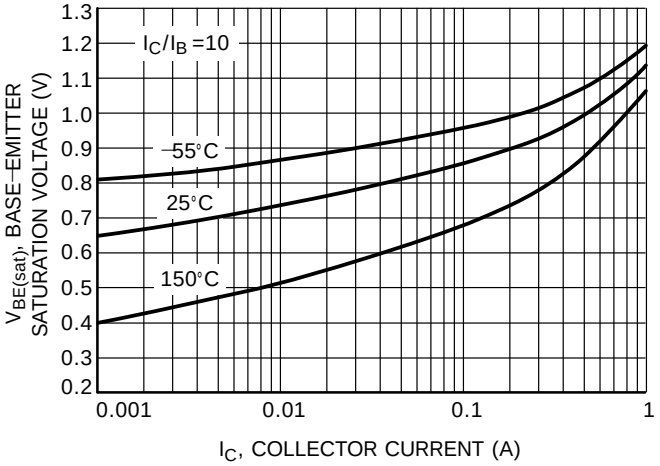


Figure 10. Base Emitter Saturation Voltage vs. Collector Current

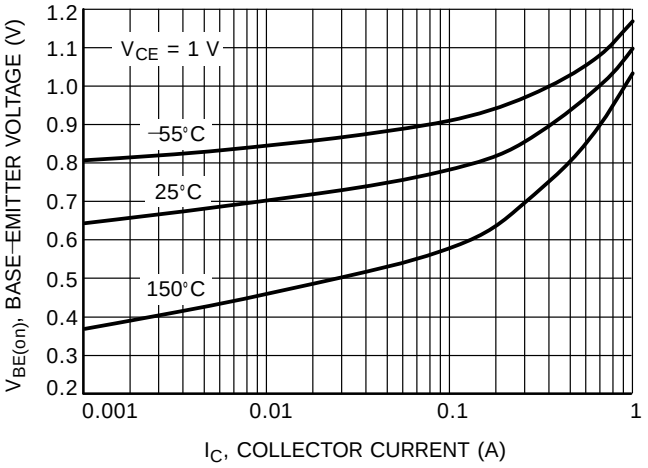


Figure 11. Base Emitter Voltage vs. Collector Current

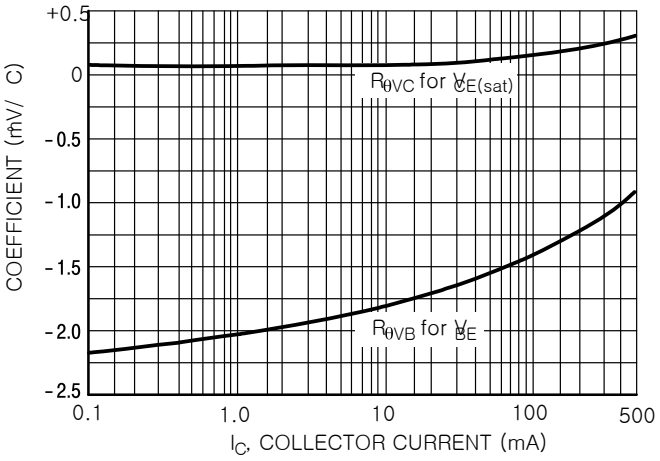


Figure 12. Temperature Coefficients

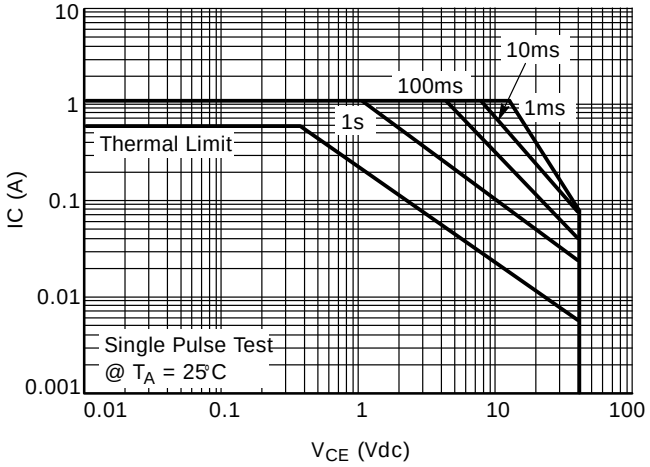


Figure 13. Safe Operating Area

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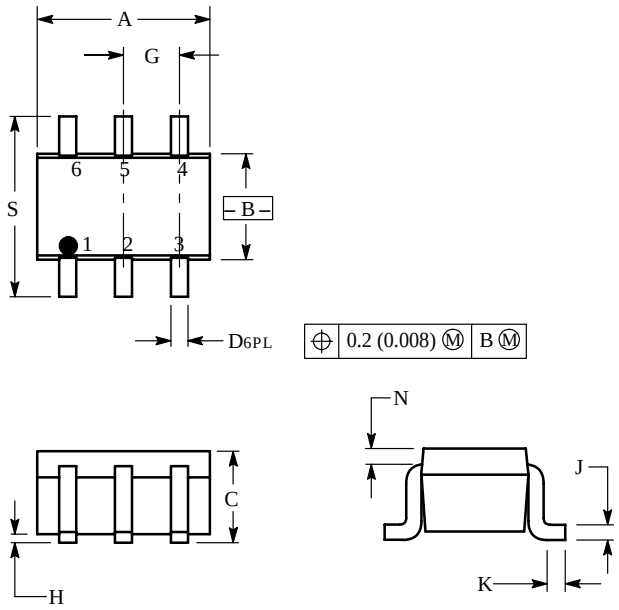

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

PIN 1 EMITTER 2
2 BASE 2
3 COLLECTOR 1
4 EMITTER 1
5 BASE 1
6 COLLECTOR 2