

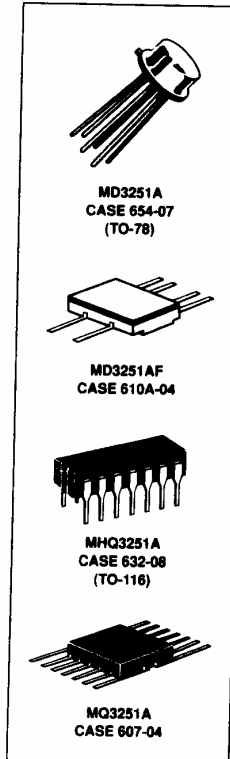
MD3251AHX, HXV (DUAL)
MD3251AFHXV (DUAL)
MHQ3251AHX, HXV (QUAD)
MQ3251AHXV (QUAD)

CRYSTALONCS
2805 Veterans Highway
Suite 14
Ronkonkoma, N.Y. 11779

PNP Silicon Dual/Quad
Small-Signal Transistors

... designed for general-purpose amplifier applications. Matched devices for DC current gain, base-emitter saturation voltage, and tracking over military temperature range.

MAXIMUM RATINGS				
Rating	Symbol	Value		Unit
Collector-Emitter Voltage	V _{CEO}	60		Vdc
Collector-Base Voltage	V _{CBO}	60		Vdc
Emitter-Base Voltage	V _{EBO}	5.0		Vdc
Collector Current — Continuous	I _C	200		mAdc
		One Die	All Die Equal Power	
Total Device Dissipation @ T _A = 25 C	P _T			Watts
MD3251A		0.575	0.625	
MD3251AF		0.35	0.4	
MHQ3251A		0.5	1.5	
MQ3251A		0.4	0.6	
Derate above 25 C				mW/°C
MD3251A		3.29	3.57	
MD3251AF		1.0	2.28	
MHQ3251A		2.86	8.58	
MQ3251A		2.28	3.42	
@ T _C = 25 C				Watts
MD3251A		1.8	2.5	
MD3251AF		1.0	2.0	
MHQ3251A		1.0	3.5	
MQ3251A		0.9	3.6	
Derate above 25°C				mW/°C
MD3251A		10.3	14.3	
MD3251AF		5.71	11.4	
MHQ3251A		5.71	20	
MQ3251A		5.13	20.5	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-65 to 200		°C



ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ⁽¹⁾ (I _C = 10 mA, I _B = 0)	V _{(BR)CEO}	60	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	60	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μA, I _C = 0)	V _{(BR)EBO}	5.0	—	Vdc
Collector Cutoff Current (V _{CB} = 40 Vdc, I _E = 0) (V _{CB} = 40 Vdc, I _E = 0, T _A = 150°C)	I _{CBO}	— —	20 10	nAdc μAdc
Collector Cutoff Current (V _{CE} = 40 Vdc, V _{EB(off)} = 3.0 Vdc) (V _{CE} = 40 Vdc, V _{EB(off)} = 3.0 Vdc, T _A = 150°C)	I _{CEX}	— —	20 20	nAdc μAdc
Emitter Cutoff Current (V _{CE} = 40 Vdc, V _{EB(off)} = 3.0 Vdc)	I _{BEX}	—	50	nAdc
ON CHARACTERISTICS				
DC Current Gain ⁽¹⁾ (I _C = 0.1 mA, V _{CE} = 1.0 Vdc) (I _C = 1.0 mA, V _{CE} = 1.0 Vdc) (I _C = 10 mA, V _{CE} = 1.0 Vdc) ⁽¹⁾ (I _C = 50 mA, V _{CE} = 1.0 Vdc) ⁽¹⁾ (I _C = 1.0 mA, V _{CE} = 1.0 Vdc, T _A = -55°C)	h _{FE}	80 90 100 30 40	— — 300 — —	—
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 50 mA, I _B = 5.0 mA) ⁽¹⁾	V _{CE(sat)}	— —	0.25 0.5	Vdc
Base-Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 50 mA, I _B = 5.0 mA) ⁽¹⁾	V _{BE(sat)}	0.6 —	0.9 1.2	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 100 kHz to 1.0 MHz)	C _{obo}	—	6.0	pF
Input Capacitance (V _{BE} = 1.0 Vdc, I _C = 0, f = 100 kHz to 1.0 MHz)	C _{ibo}	—	8.0	pF
Current Gain (I _C = 1.0 mA, V _{CE} = 10 Vdc, f = 1.0 kHz)	h _{fe}	100	400	—
Small-Signal Current Transfer Ratio, Magnitude (I _C = 10 mA, V _{CE} = 20 Vdc, f = 100 MHz)	h _{fe}	3.0	9.0	—
SWITCHING CHARACTERISTICS				
Delay Time	t _d	—	35	ns
Rise Time	t _r	—	35	ns
Storage Time	t _s	—	200	ns
Fall Time	t _f	—	50	ns

(1) Pulsed. Pulse Width ≤ 300 μs. Duty Cycle ≤ 2.0%

(continued)

ELECTRICAL CHARACTERISTICS — continued (T _A = 25°C unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
MATCHING CHARACTERISTICS (Duals Only)				
DC Current Gain Ratio (I _C = 0.1 mA, V _{CE} = 5.0 Vdc) (I _C = 1.0 mA, V _{CE} = 5.0 Vdc)	h _{FE1} /h _{FE2} *	0.9 0.9	1.0 1.0	—
Base-Emitter Voltage Differential (I _C = 0.01 mA, V _{CE} = 5.0 Vdc) (I _C = 0.1 mA, V _{CE} = 5.0 Vdc) (I _C = 10 mA, V _{CE} = 5.0 Vdc)	(V _{BE1} - V _{BE2})	— — —	5.0 3.0 5.0	mVdc
Base-Emitter Voltage Differential Change Due to Temperature (I _C = 0.1 mA, V _{CE} = 5.0 Vdc, T _A = -55 to +25°C) (I _C = 0.1 mA, V _{CE} = 5.0 Vdc, T _A = +25 to +125°C)	Δ(V _{BE1} - V _{BE2})	— —	0.8 1.0	mVdc

ASSURANCE TESTING (Pre/Post Burn-In)				
Characteristics Tested	Symbol	Initial and End Point Limits		Unit
		Min	Max	
Collector Cutoff Current (V _{CB} = 40 Vdc)	I _{CBO}	—	20	nAdc
DC Current Gain ⁽¹⁾ (I _C = 10 mA, V _{CE} = 1.0 Vdc)	h _{FE}	100	300	—

Delta from Pre-Burn-In Measured Values				
		Min	Max	
Delta Collector Cutoff Current	ΔI _{CBO}	—	±100 or ±5.0 whichever is greater	% of Initial Value nAdc
Delta DC Current Gain ⁽¹⁾	Δh _{FE}	—	±25	% of Initial Value

* The lowest base current is taken as h_{FE1} for this test.