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

CRYSTALONICS
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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	P_T			Watts
@ T_A = 25 C				
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

MD3251A
CASE 654-07
(TO-78)

MD3251AF
CASE 610A-04

MHQ3251A
CASE 632-08
(TO-116)

MQ3251A
CASE 607-04

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)				
Characteristic	**Symbol**	**Min**	**Max**	**Unit**
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	60	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 µAdc, I_E = 0)	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 µAdc, 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 mAdc, V_{CE} = 1.0 Vdc) (I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc) (I_C = 10 mAdc, V_{CE} = 1.0 Vdc)(1) (I_C = 50 mAdc, V_{CE} = 1.0 Vdc)(1) (I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc, T_A = −55°C)	h_{FE}	 80 90 100 30 40	 — — 300 — —	—
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)(1)	$V_{CE(sat)}$	— —	0.25 0.5	Vdc
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)(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 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	100	400	—
Small-Signal Current Transfer Ratio, Magnitude (I_C = 10 mAdc, 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 mAdc, V_{CE} = 5.0 Vdc) (I_C = 1.0 mAdc, 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 mAdc, V_{CE} = 5.0 Vdc) (I_C = 0.1 mAdc, V_{CE} = 5.0 Vdc) (I_C = 10 mAdc, 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 mAdc, V_{CE} = 5.0 Vdc, T_A = −55 to + 25°C) (I_C = 0.1 mAdc, V_{CE} = 5.0 Vdc, T_A = +25 to +125°C)	$\Delta(V_{BE1}-V_{BE2})$	— —	0.8 1.0	mVdc

ASSURANCE TESTING (Pre/Post Burn-In)				
		Initial and End Point Limits		
Characteristics Tested	**Symbol**	**Min**	**Max**	**Unit**
Collector Cutoff Current (V_{CB} = 40 Vdc)	I_{CBO}	—	20	nAdc
DC Current Gain(1) (I_C = 10 mAdc, 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 hFE reading is taken as hFE1 for this ratio.