

MD7021,F MQ7021

MD7021
CASE 654-07, STYLE 5

MD7021F
CASE 610A-04, STYLE 1

MQ7021
CASE 607-04, STYLE 1

COMPLEMENTARY
GENERAL PURPOSE TRANSISTOR

NPN/PNP SILICON

MAXIMUM RATINGS

Rating	Symbol	Value		Unit
Collector-Emitter Voltage	V_{CEO}	40		Vdc
Collector-Base Voltage	V_{CBO}	50		Vdc
Emitter-Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	50		mAdc
		One Die	All Die Equal Power	
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	P_D			mW
		MD7021	550	600
		MD7021F	350	400
		MQ7021	400	600
		Derate above 25°C		
MD7021	3.14	3.42		
MD7021F	2.0	2.28		
MQ7021	2.28	3.42		
Total Device Dissipation @ $T_C = 25^\circ\text{C}$	P_D			Watts
		MD7021	1.4	2.0
		MD7021F	0.7	1.4
		MQ7021	0.7	2.8
		Derate above 25°C		
MD7021	8.0	11.4		
MD7021F	4.0	8.0		
MQ7021	4.0	16		
Operating and Storage Junction Temperature Range	T_J, T_{stg}	- 65 to + 200		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	One Die	All Die Equal Power	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$			$^\circ\text{C/W}$
		MD7021	125	87.5
		MD7021F	250	125
		MQ7021	250	62.6
Thermal Resistance, Junction to Ambient	$R_{\theta JA}(1)$			$^\circ\text{C/W}$
		MD7021	319	292
		MD7021F	500	438
		MQ7021	438	292
		Junction to Ambient	Junction to Case	
Coupling Factor				%
	MD7021	83	40	
	MD7021F	75	0	
	MQ7021 (Q1-Q2)	57	0	
	MQ7021 (Q1-Q3 or Q1-Q4)	55	0	

(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(2) ($I_C = 10 \text{ mAdc}, I_E = 0$)	$V_{(BR)CEO}$	40	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	50	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30 \text{ Vdc}, I_E = 0$)	I_{CBO}	—	—	100	nAdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 100 \mu\text{Adc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)	h_{FE}	40	65	—	—
		50	70	—	—

MD7021,F, MQ7021

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

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1.0 \text{ mAdc}$ (2))	$V_{CE(sat)}$	—	—	0.35	Vdc
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1.0 \text{ mAdc}$)	$V_{BE(sat)}$	—	—	1.0	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 5.0 \text{ mAdc}$, $V_{CE} = 20 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	200	320	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 100 \text{ kHz}$)	C_{obo}	—	—	6.0	pF
Input Capacitance ($V_{BE} = 2.0 \text{ Vdc}$, $I_C = 0$, $f = 100 \text{ kHz}$)	C_{ibo}	—	—	8.0	pF

SWITCHING CHARACTERISTICS

Turn-On Time ($V_{CC} = 30 \text{ Vdc}$, $V_{BE(off)} = 0.5 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = 15 \text{ Adc}$)	t_{on}	—	28	—	ns
Turn-Off Time ($V_{CC} = 30 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = I_{B2} = 15 \text{ mAdc}$)	t_{off}	—	72	—	ns

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

5