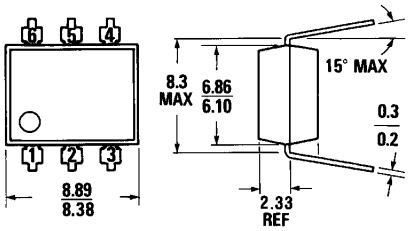
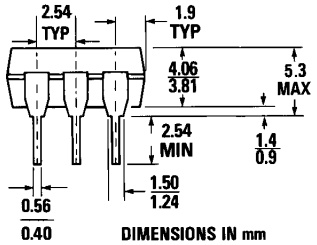
QT OPTOELECTRONICS

PHOTOTRANSISTOR OPTOCOUPLERS

MCT2200
MCT2201
MCT2202

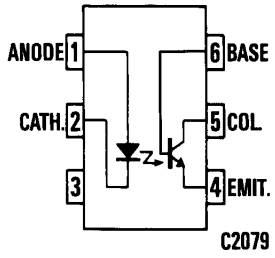
PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE K

ST1603A



Equivalent Circuit

DESCRIPTION

The MCT2200, MCT2201 and MCT2202 are opto-isolators with phototransistor output. A gallium arsenide infrared emitting diode is selectively coupled with an NPN silicon phototransistor.

FEATURES

- Minimum current transfer ratio of 100%
- Maximum turn-on, turn-off time — 10 μs
- Underwriters Laboratory (UL) recognized File #E90700

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Appliance sensor systems
- Industrial controls

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

Storage temperature	−55°C to 150°C
Operating temperature	−55°C to 100°C
Lead soldering temperature (10 sec.)	260°C
Total package power dissipation at 25°C ambient (LED plus detector)	260 mW
Derate linearly from 25°	3.5 mW/°C

INPUT DIODE

Forward current	60 mA
Reverse voltage	3.0 V
Peak forward current (1 μs pulse, 300 pps)	3.0 A
Power dissipation at 25°C ambient	135 mW
Derate linearly from 25°C	1.8 mW/°C

OUTPUT TRANSISTOR

Power dissipation at 25°C ambient	200 mW
Derate linearly from 25°C	2.67 mW/°C

ELECTRO-OPTICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
INPUT DIODE						
Forward voltage	V_F		1.3	1.50	V	I_F=20 mA
Forward voltage temperature coefficient	$\frac{\Delta V_F}{\Delta T_A}$		−1.8		mV/°C	
Reverse voltage	V_R	3.0	25		V	I_R=10 μA
Junction capacitance	C_J		50		pF	V_F=0 V, f=1 MHz
			65		pF	V_F=0 V, f=1 MHz
Reverse leakage current	I_R		.35	10	μA	V_R=3.0 V
OUTPUT TRANSISTOR						
Breakdown voltage Collector to emitter	BV_{CEO}	30	45		V	I_C=1.0 mA, I_F=0
Collector to base	BV_{CBO}	70	130		V	I_C=10 μA, I_F=0
Emitter to base	BV_{EBO}	5	7		V	I_E=100 μA, I_F=0
Leakage current Collector to emitter	I_{CEO}		5	50	nA	V_{CE}=10 V, I_F=0
Collector to base	I_{CBO}			20	nA	V_{CB}=10 V, I_F=0
Capacitance Collector to emitter			8		pF	V_{CE}=0, f=1 MHz
Collector to base			20		pF	V_{CB}=5, f=1 MHz
Emitter to base			10		pF	V_{EB}=0, f=1 MHz

TRANSFER CHARACTERISTICS

DC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Current Transfer Ratio, collector to emitter MCT2200	CTR	20	60		%	
MCT2201		100	200		%	I_F=10 mA; V_{CE}=5V
MCT2202		63	95	125	%	
Saturation voltage	$V_{CE(SAT)}$		.21	.40	V	I_F=10 mA; I_C=2.5 mA

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SWITCHING TIMES						
Non-saturated Turn-on time	t_{on}		6.0	10	μs	R_L=100 Ω; I_C=2 mA; V_{CC}=10 V
Turn-off time	t_{off}		5.5	10	μs	See Figure 10.

ISOLATION CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Isolation voltage	V_{iso}	5300			V_{AC} RMS	$I_{I-O} \leq 1$ μA, 1 minute
	V_{iso}	7500			V_{AC} PEAK	$I_{I-O} \leq 1$ μA, 1 minute
Isolation resistance	R_{iso}	10^{11}			ohms	V_{I-O}=500 VDC
Isolation capacitance	C_{iso}		0.5		pF	f=1 MHz

ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)

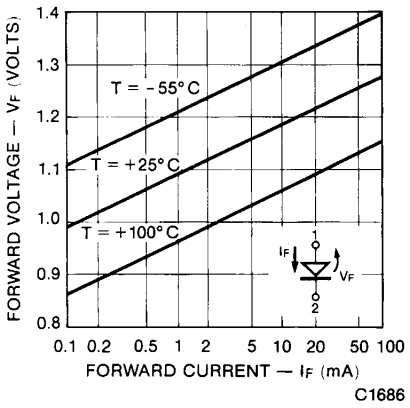


Fig. 1. Forward Voltage vs. Current

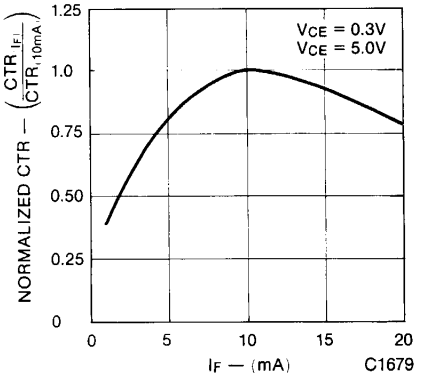


Fig. 2. Normalized CTR vs. Forward Current

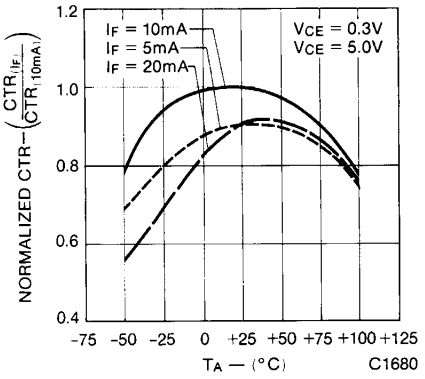


Fig. 3. Normalized CTR vs. Temperature

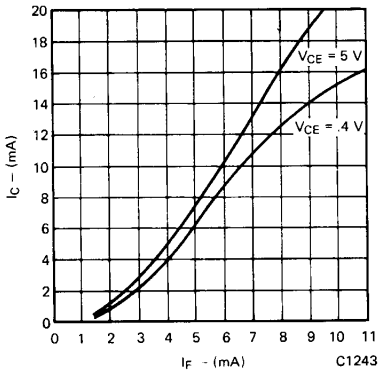


Fig. 4. Collector Current vs. Forward Current

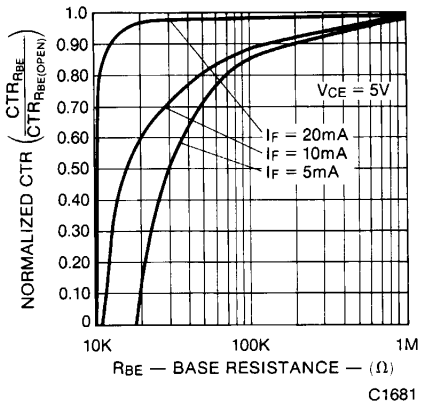


Fig. 5. CTR vs. RBE (Unsaturated)

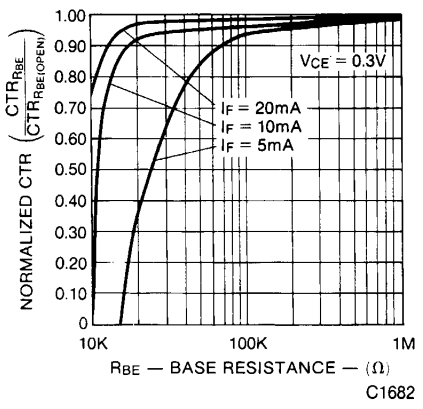


Fig. 6. CTR vs. RBE (Saturated)

ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

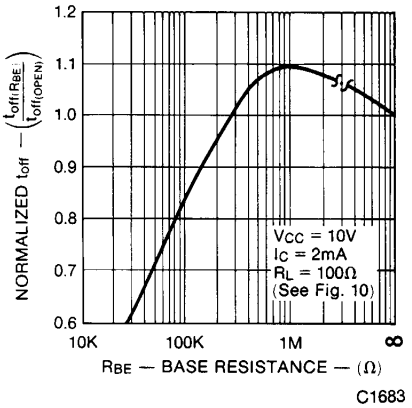


Fig. 7. Normalized T_{OFF} vs. RBE

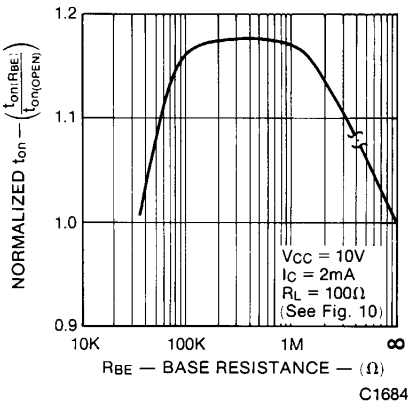


Fig. 8. Normalized T_{ON} vs. RBE

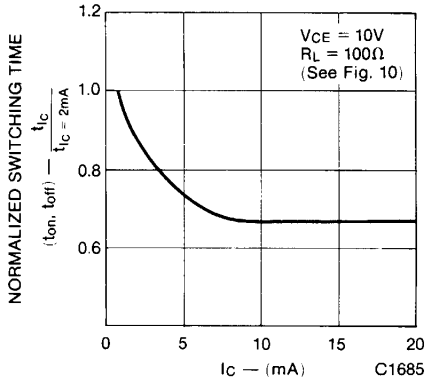


Fig. 9. Switching Time vs. IC

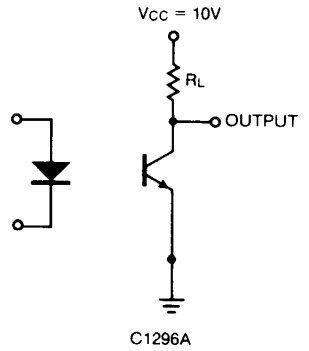


Fig. 10. Switching Time Test Circuit

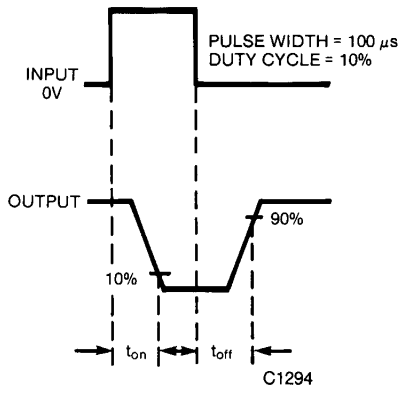


Fig. 11. Switching Time Waveforms