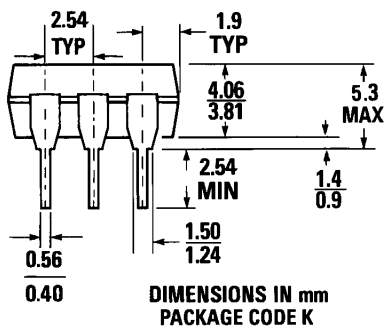
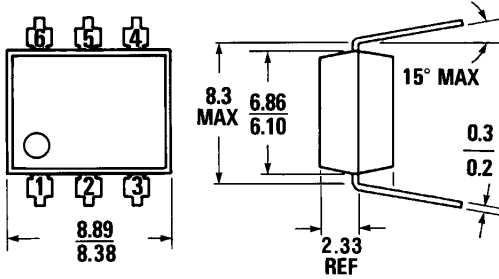
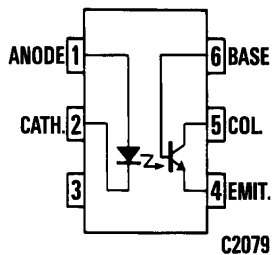


PACKAGE DIMENSIONS



ST1603A



Equivalent Circuit

DESCRIPTION

The MCT271 is a phototransistor-type optically coupled isolator. A gallium arsenide infrared emitting diode is selectively coupled with an NPN silicon phototransistor.

FEATURES

- Controlled Current Transfer Ratio—45% to 90% (specified conditions)
- Maximum Turn-on-time—7 μ seconds (specified condition)
- Maximum Turn-off-time—7 μ seconds (specified condition)
- Underwriters Laboratory (U.L.) recognized—File E90700

APPLICATIONS

- Switching networks
- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

Storage temperature	−55°C to 150°C
Operating temperature	−55°C to 100°C
Lead temperature	
(soldering, 10 sec)	260°C
Total package power dissipation @ 25°C	
(LED plus detector)	260 mW
Derate linearly from 25°C	3.4 mW/°C

INPUT DIODE

Forward DC current	60 mA
Reverse voltage	3 V
Peak forward current	
(1 μ s pulse, 300 pps)	3.0 A
Power dissipation 25°C ambient	90 mW
Derate linearly from 25°C	1.2 mW/°C

OUTPUT TRANSISTOR

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



PHOTOTRANSISTOR OPTOCOUPLER

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

INDIVIDUAL COMPONENT CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
INPUT DIODE						
Forward voltage	V_f		1.20	1.50	V	$I_f=20$ mA
Forward voltage temp. coefficient	$\frac{\Delta V_f}{\Delta T_A}$		-1.8		mV/°C	
Reverse voltage	V_R	3.0	25		V	$I_R=10$ μ A
Junction capacitance	C_j		50		pF	$V_f=0$ V, $f=1$ MHz
			65		pF	$V_f=1$ V, $f=1$ MHz
Reverse leakage current	I_R		0.35	10	μ A	$V_R=3.0$ V
OUTPUT TRANSISTOR						
DC forward current gain	h_{FE}	100	420			$V_{CE}=5$ V, $I_C=100$ μ A
Breakdown voltage					V	$I_C=1.0$ mA, $I_F=0$
Collector to emitter	BV_{CEO}	30	45		V	$I_C=1.0$ mA, $I_F=0$
Collector to base	BV_{CBO}	70	130		V	$I_C=10$ μ A, $I_F=0$
Emitter to base	BV_{EBO}	5	7		V	$I_E=100$ μ A, $I_F=0$
Leakage current					nA	$V_{CE}=10$ V, $I_F=0$
Collector to emitter	I_{CEO}		5	50	nA	$V_{CE}=10$ V, $I_F=0$
Capacitance					pF	$V_{CE}=0$, $f=1$ MHz
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 (a)	CTR_{CE}	45	67	90	%	$I_F=10$ mA; $V_{CE}=10$ V
Current transfer ratio, collector to base	CTR_{CB}		0.15		%	$I_F=10$ mA; $V_{CB}=10$ V
Saturation voltage	$V_{CE(SAT)}$		0.14	.40	V	$I_F=16$ mA; $I_C=2$ mA

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SWITCHING TIMES						
Non-saturated						
Turn-on time	t_{on}		4.9	7	μ s	$R_L=100\Omega$; $I_C=2$ mA; $V_{CC}=5$ V
Turn-off time	t_{off}		4.5	7	μ s	See Figs. 10, 11
Saturated						
Turn-on time	t_{on}		5.2		μ s	$I_F=16$ mA; $R_L=1.9$ K Ω
Turn-off time (Approximates a typical TTL interface)	t_{off}		38		μ s	See Figs. 10, 11
Turn-on time	t_{on}		4.9		μ s	$I_F=16$ mA; $R_L=4.7$ K Ω
Turn-off time (Approximates a typical low power TTL interface)	t_{off}		90		μ s	See Figs. 10, 11

ELECTRO-OPTICAL CHARACTERISTICS
(25°C Temperature Unless Otherwise Specified) (Cont'd)

ISOLATION CHARACTERISTICS						
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Steady state isolation	V_{iso}	7500			VAC-PEAK	$I_{CO} \leq 1 \mu A$, 1 minute
		5300			VAC-rms	$I_{CO} \leq 1 \mu A$, 1 minute
Isolation resistance	R_{iso}	10^{11}			ohms	$V_{FO} = 500$ VDC
Isolation capacitance	C_{iso}		0.5		pF	$f = 1$ MHz

TYPICAL ELECTRICAL CHARACTERISTIC CURVES
(25°C Free Air Temperature Unless Otherwise Specified)

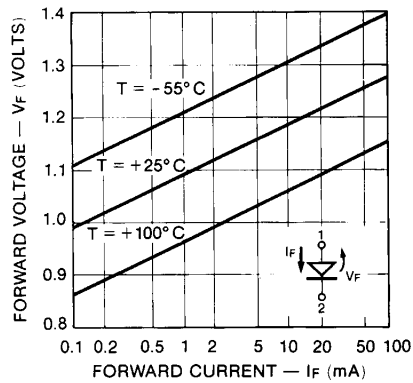


Fig. 1. Forward Voltage vs. Current

C1686

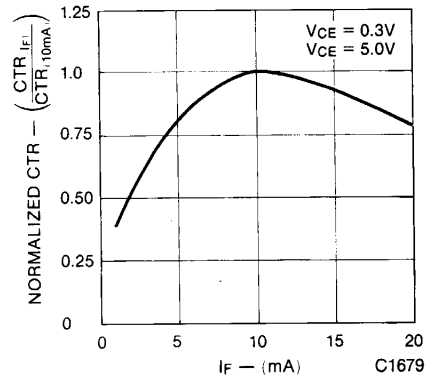


Fig. 2. Normalized CTR vs. Forward Current

C1679

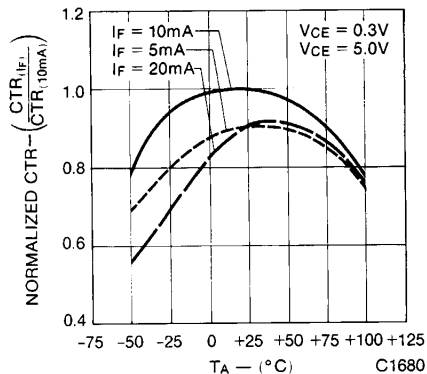


Fig. 3. Normalized CTR vs. Temperature

C1680

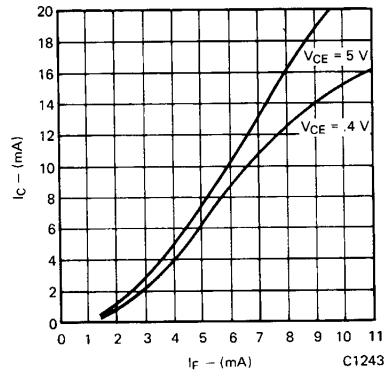
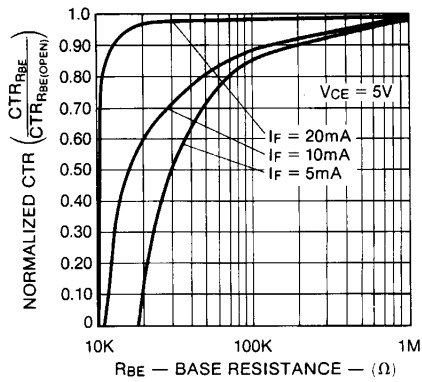


Fig. 4. Collector Current vs. Forward Current

C1243

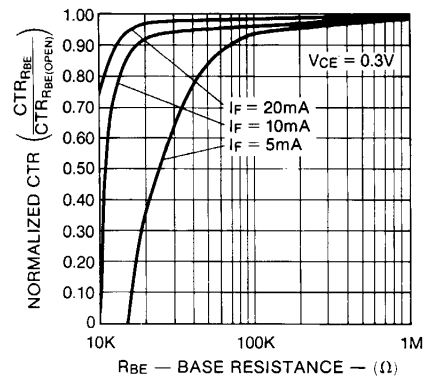
TYPICAL ELECTRICAL CHARACTERISTIC CURVES

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



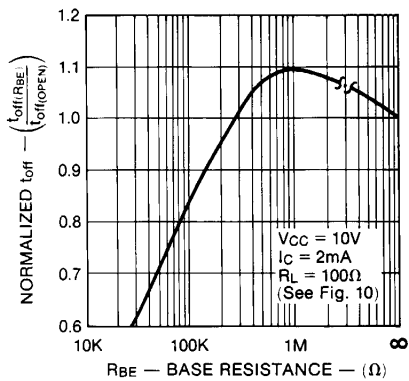
C1681

Fig. 5. CTR vs. RBE (Unsaturated)



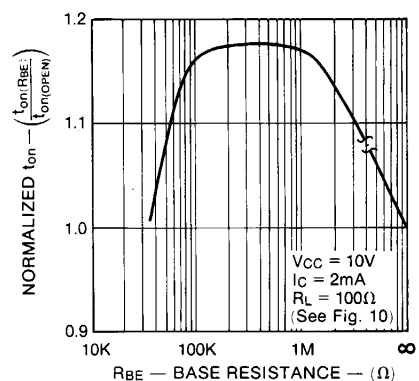
C1682

Fig. 6. CTR vs. RBE (Saturated)



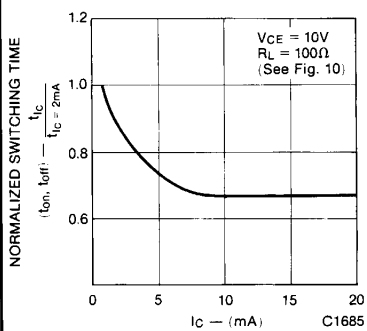
C1683

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



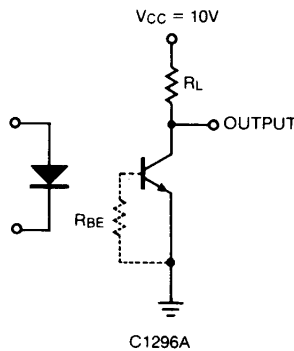
C1684

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



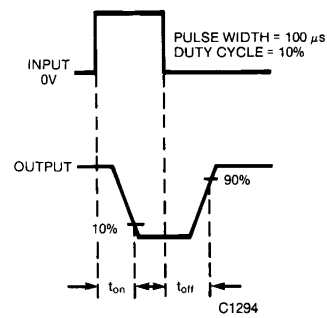
C1685

Fig. 9. Switching Time vs. I_C



C1296A

Fig. 10. Switching Time Test Circuit



C1294

Fig. 11. Switching Time Waveforms