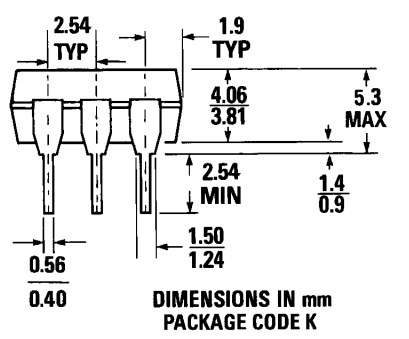
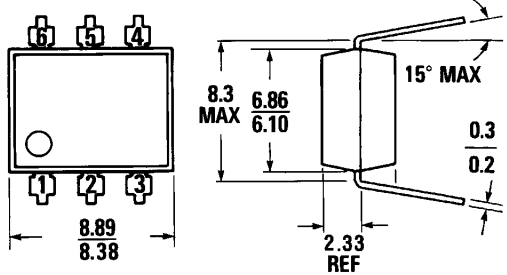
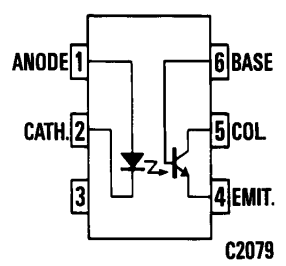


PACKAGE DIMENSIONS



ST1603A



Equivalent Circuit

DESCRIPTION

The MCT270 is a phototransistor-type optically coupled isolator. A gallium arsenide infrared emitting diode is selectively coupled with an NPN silicon phototransistor.

FEATURES

- Minimum current transfer ratio of 50%
- Maximum turn-on, turn-off time 10 μ seconds specified
- Underwriters Laboratory (UL) recognized File E90700

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS	
TOTAL PACKAGE	
Storage temperature	-55°C to 150°C
Operating temperature	-55°C to 100°C
Lead tempertaure (soldering, 10 sec)	260°C
Total package power dissipation @ 25 (LED plus detector)	260 mW
Derate linearly from 25°C	3.5 mW/°C
INPUT DIODE	
Forward DC current	90 mA
Reverse voltage	3 V
Peak forward current (1 μ s pulse, 300 pps)	3.0 A
Power dissipation 25°C ambient	135 mW
Derate linearly from 25°C	1.8 mW/°C
OUTPUT TRANSISTOR	
Power dissipation @ 25°C	200 mW
Derate linearly from 25°C	2.67 mW/°C

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		1.3	1.50	V	$I_f = 20 \text{ mA}$
Forward voltage temp. coefficient	$\frac{\Delta V_f}{\Delta T_A}$		-1.8		mV/°C	
Reverse voltage	V_R	3.0	25		V	$I_R = 10 \text{ } \mu\text{A}$
Junction capacitance	C_J		50 65		pF pF	$V_f = 0 \text{ V}, f = 1 \text{ MHz}$ $V_f = 1 \text{ V}, f = 1 \text{ MHz}$
Reverse leakage current	I_R		0.35	10	μA	$V_R = 3.0 \text{ V}$
OUTPUT TRANSISTOR						
DC forward current gain	h_{FE}	100	500			$V_{CE} = 5 \text{ V}, I_C = 100 \text{ } \mu\text{A}$
Breakdown voltage Collector to emitter	BV_{CEO}	30	45		V	$I_C = 1.0 \text{ mA}, I_F = 0$
Collector to base	BV_{CBO}	70	130		V	$I_C = 10 \text{ } \mu\text{A}, I_F = 0$
Emitter to base	BV_{EBO}	5	7		V	$I_E = 100 \text{ } \mu\text{A}, I_F = 0$
Leakage current Collector to emitter	I_{CEO}		5	50	nA	$V_{CE} = 10 \text{ V}, I_F = 0$
Collector to base	I_{CBO}			20	nA	$V_{CB} = 10 \text{ V}, I_F = 0$
Capacitance Collector to emitter			8		pF	$V_{CE} = 0, f = 1 \text{ MHz}$
Collector to base			20		pF	$V_{CB} = 5, f = 1 \text{ MHz}$
Emitter to base			10		pF	$V_{EB} = 0, f = 1 \text{ MHz}$

TRANSFER CHARACTERISTICS

DC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Current transfer ratio, collector to emitter	CTR_{CE}	50	115		%	$I_F = 10 \text{ mA}; V_{CE} = 10 \text{ V}$
Current transfer ratio, collector to base	CTR_{CB}	0.045	0.15		%	$I_F = 16 \text{ mA}; V_{CB} = 10 \text{ V}$
Saturation voltage	$V_{CE(SAT)}$.21	.40	V	$I_F = 10 \text{ mA}; I_C = 2 \text{ mA}$

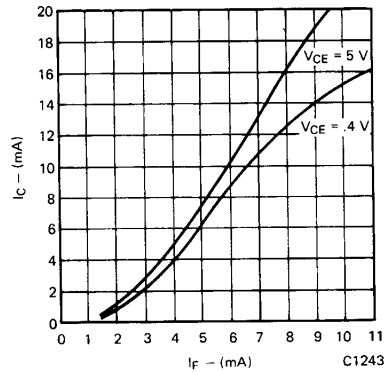
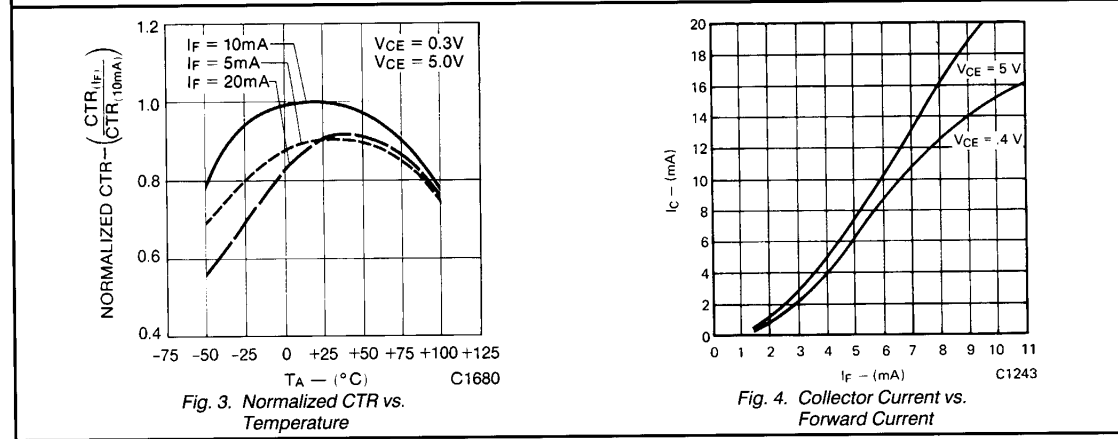
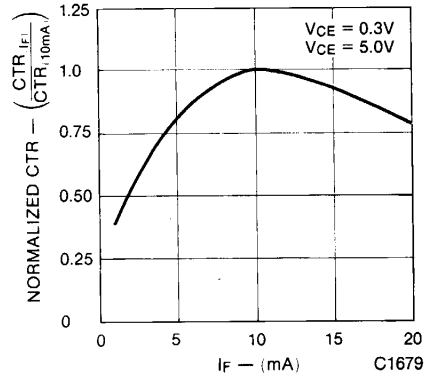
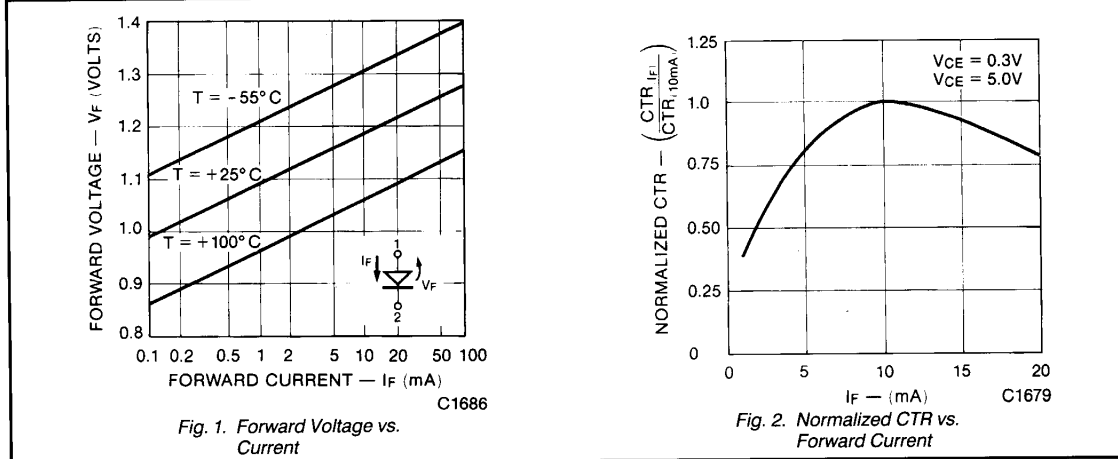
TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SWITCHING TIMES						
Non-saturated						
Turn-on time	t_{on}		6.0	10	μs	$R_L = 100\Omega; I_C = 2 \text{ mA}; V_{CC} = 5 \text{ V}$
Turn-off time	t_{off}		5.5	10	μs	See Figs. 10, 11
Saturated						
Turn-on time	t_{on}		3.9		μs	$I_F = 16 \text{ mA}; R_L = 1.9 \text{ K}\Omega$
Turn-off time	t_{off}		48		μs	See Figs. 10, 11
(Approximates a typical TTL interface)						
Turn-on time	t_{on}		3.9		μs	$I_F = 16 \text{ mA}; R_L = 4.7 \text{ K}\Omega$
Turn-off time	t_{off}		110		μs	See Figs. 10, 11
(Approximates a typical low power TTL interface)						

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

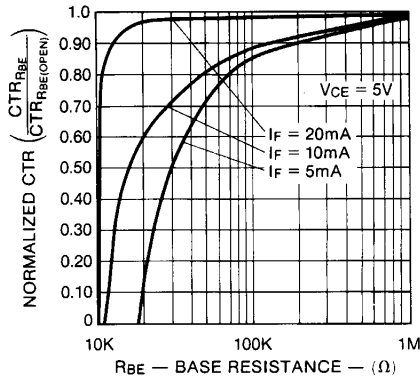
ISOLATION CHARACTERISTICS						
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Steady state isolation	V_{iso}	7500			VAC-PEAK	$I_{o} \leq 1 \mu A$, 1 minute
		5300			VAC-rms	$I_{o} \leq 1 \mu A$, 1 minute
Isolation resistance	R_{iso}	10^{11}			ohms	$V_{i0} = 500$ VDC
Isolation capacitance	C_{iso}		0.5		pF	$f = 1$ MHz

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



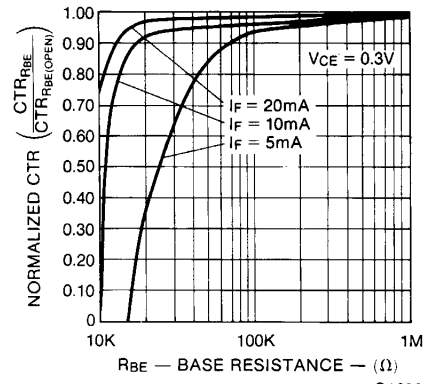
TYPICAL ELECTRICAL CHARACTERISTIC CURVES

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



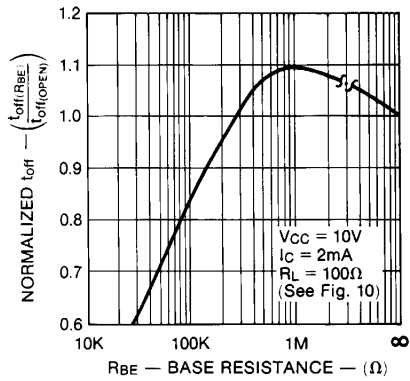
C1681

Fig. 5. CTR vs. RBE (Unsaturated)



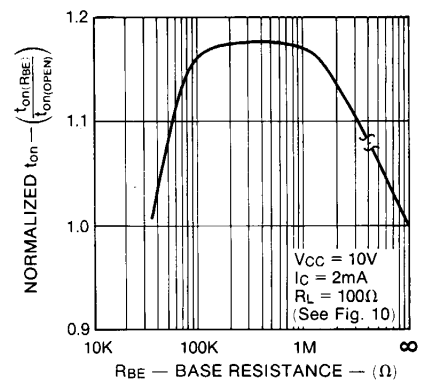
C1682

Fig. 6. CTR vs. RBE (Saturated)



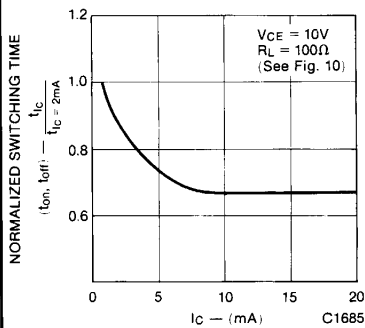
C1683

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



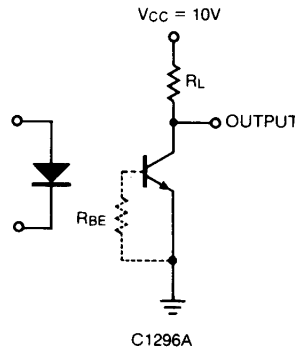
C1684

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



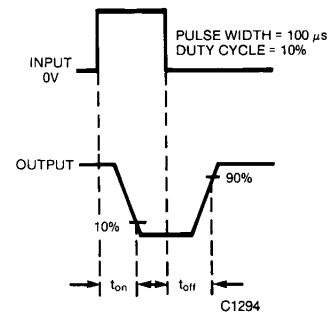
C1685

Fig. 9. Switching Time vs. I_C



C1296A

Fig. 10. Switching Time Test Circuit



C1294

Fig. 11. Switching Time Waveforms



PHOTOTRANSISTOR OPTOCOUPERS

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