SIEMENS

MCT5210
MCT5211
AlGaAs LED/ Phototransistor Optocoupler

FEATURES
- **Current Transfer Ratio**
  MCT5210, >70% at I_F=3.0 mA
  MCT5211, >110% at I_F=1.0 mA
- **Saturation CTR–MCT5211, >100% at I_F=1.6 mA**
- **High Isolation Voltage, 5300 VAC_{RMS}**
- **Underwriters Lab File #E52744**
- **VDE #0884 Available with Option 1**

DESCRIPTION
The MCT5210/5211 are optocouplers with a high efficiency AlGaAs LED optically coupled to a NPN phototransistor. The high performance LED makes operation at low input currents practical. The coupler is housed in a double molded, six pin DIP package. Isolation test voltage is 5300 VAC_{RMS}.

Because these parts have guaranteed CTRs at one and three mA, they are ideally suitable for interfacing from CMOS to TTL or LSTTL to TTL. They are also ideal for telecommunications applications such as ring or off-hook detection.

Maximum Ratings
Emitter

Peak Reverse Voltage .... 6 V
Continuous Forward Current .... 40 mA
Power Dissipation at 25°C................................ 75 mW
Derate Linearly from 25°C .... 1.0 mW/°C

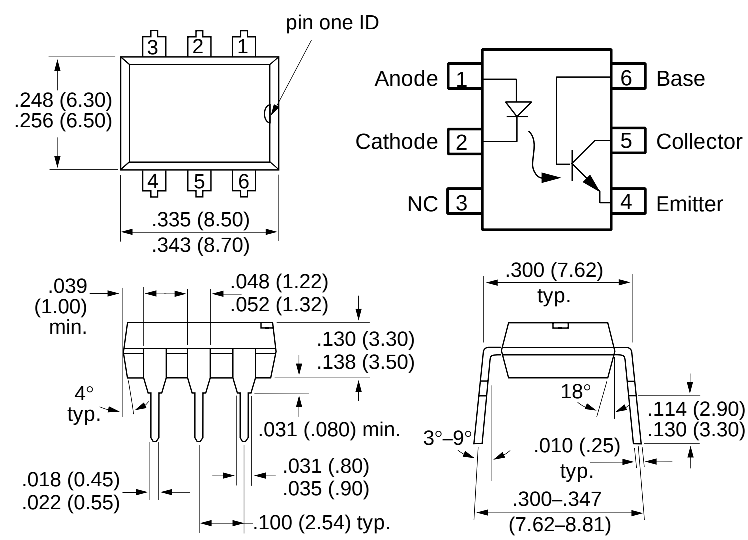
Detector

Collector-Emitter Breakdown Voltage.................... 30 V
Emitter-Collector Breakdown Voltage...................... 7 V
Collector-Base Breakdown Voltage...................... 70 V
Power Dissipation.. 200 mW
Derate Linearly from 25°C .... 2.6 mW/°C

Package

Isolation Test Voltage............................. 5300 VAC_{RMS}
Total Package Dissipation
at 25°C Ambient (LED + Detector).............. 260 mW
Derate Linearly from 25°C .... 3.5 mW/°C
Leakage Path .... 7 mm min.
Clearance Path... 7 mm min.
Comparative Tracking Index per
DIN IEC 112/VDE 0303, part 1 175
Isolation Resistance
V_{IO}=500 V, T_A=25°C .... ≥10^{12} Ω
V_{IO}=500 V, T_A=100°C .... ≥10^{11} Ω
Operating Temperature ....–55°C to +100°C
Storage Temperature........................–55°C to +150°C

Dimensions in inches (mm)



Electrical Characteristics (25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter						
Forward Voltage	V_F		1.2	1.5	V	I_F=5 mA
Reverse Voltage	V_R	6			V	I_R=10 µA
Detector						
	HFE	100	200			V_{CE}=5 V I_C=100 µA
	BV_{CEO}	30			V	I_C=100 µA
	BV_{ECO}	7			V	I_E=100 µA
	BV_{CBO}	70			V	I_E=10 µA
	I_{CEO}		5	100	nA	V_{CE}=10 V
Package (0–70°C)						
Saturated Current Transfer Ratio						V_{CE}=0.4 V
MCT5210 MCT5211 MCT5211	CTR_{CEsat} CTR_{CEsat} CTR_{CEsat}	60 100 75	120 200 150		% % %	I_F=3.0 mA I_F=1.6 mA I_F=1.0 mA
Current Transfer Ratio						V_{CE}=5.0 V
MCT5210 MCT5211 MCT5211	CTR CTR CTR	70 150 110	150 300 225		% % %	I_F=3.0 mA I_F=1.6 mA I_F=1.0 mA
Collector-Base Current Transfer Ratio						V_{CE}=4.3 V
MCT5210 MCT5211 MCT5211	CTR_{CB} CTR_{CB} CTR_{CB}	0.2 0.3 0.25	0.4 0.6 0.5		% % %	I_F=3.0 mA I_F=1.6 mA I_F=1.0 mA
Saturation Voltage						
MCT5210	V_{CEsat}		0.25	0.4	V	I_F=3.0 mA I_C=1.8 mA
MCT5211	V_{CEsat}		0.25	0.4	V	I_F=1.6 mA I_C=1.6 mA

Characteristics — *continued*

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Switching Characteristics (25°C)						
Propagation Delay —High to Low						
MCT5210	tPHL		10		µs	R_L=330 Ω, I_F=3.0 mA, V_{CC}=5.0 V
MCT5211	tPHL		20		µs	R_L=750 Ω, I_F=1.6 mA, V_{CC}=5.0 V
MCT5211	tPHL		40		µs	R_L=1.5 Ω, I_F=1.0 mA, V_{CC}=5.0 V
Propagation Delay —Low to High						
MCT5210	tPLH		10		µs	R_L=330 Ω, I_F=3.0 mA, V_{CC}=5.0 V
MCT5211	tPLH		20		µs	R_L=750 Ω, I_F=1.6 mA, V_{CC}=5.0 V
MCT5211	tPLH		40		µs	R_L=1.5 Ω, I_F=1.0 mA, V_{CC}=5.0 V

Figure 1. Forward current vs. forward voltage

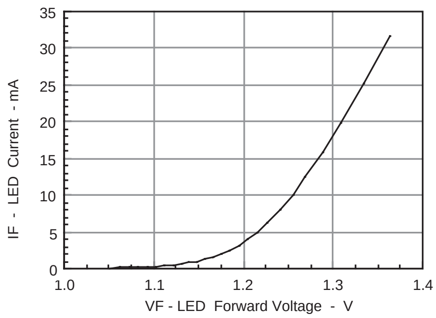


Figure 4. Collector base photocurrent vs. LED current

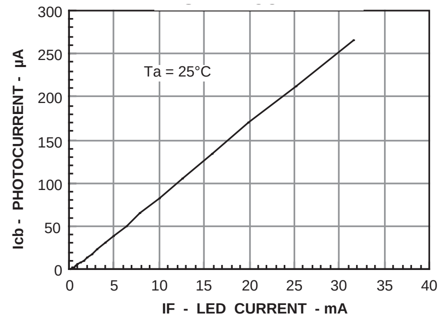


Figure 7. Collector base current transfer ratio vs. LED current

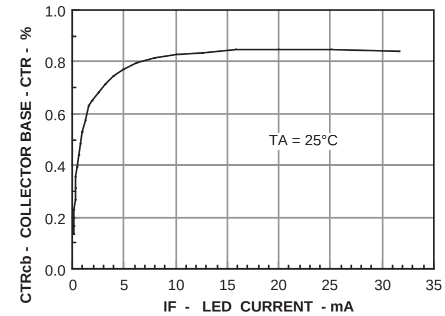


Figure 2. LED forward current vs. forward voltage

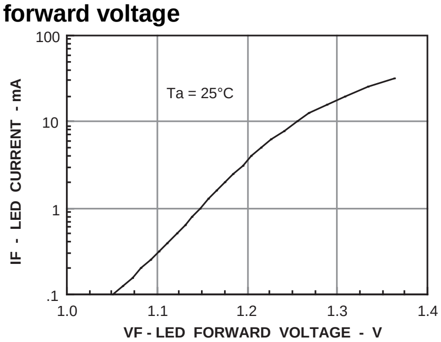


Figure 5. Photocurrent vs. LED current

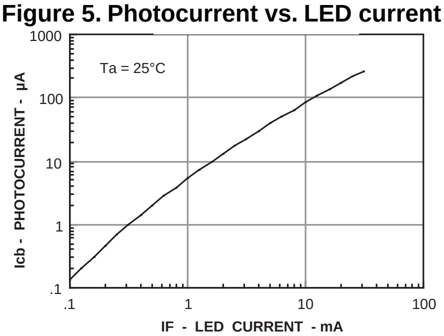


Figure 8. Collector base current transfer ratio vs. LED current

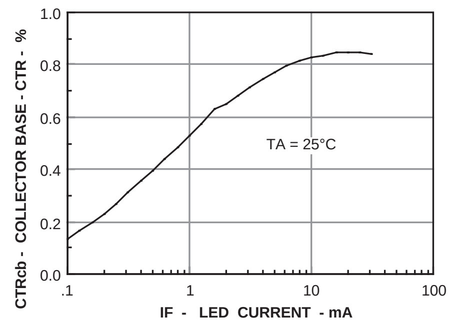


Figure 3. Switching waveform

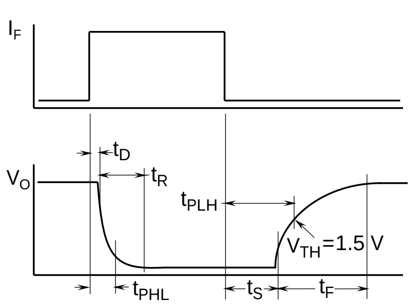


Figure 6. Switching schematic

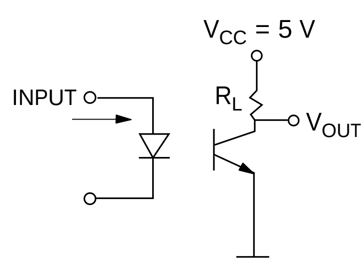


Figure 9. Current transfer ratio ratio vs. LED current

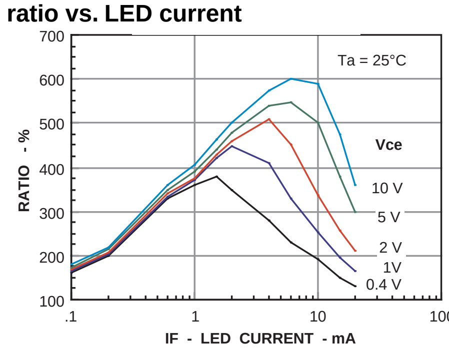


Figure 10. Collector current vs. LED current

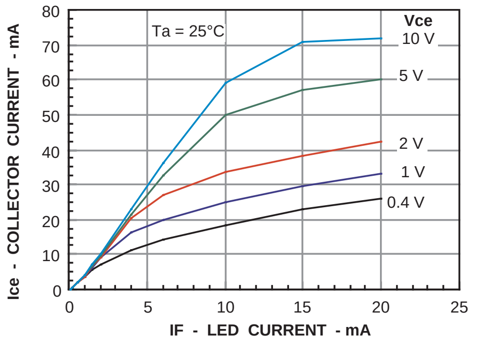


Figure 14. Transfer curve

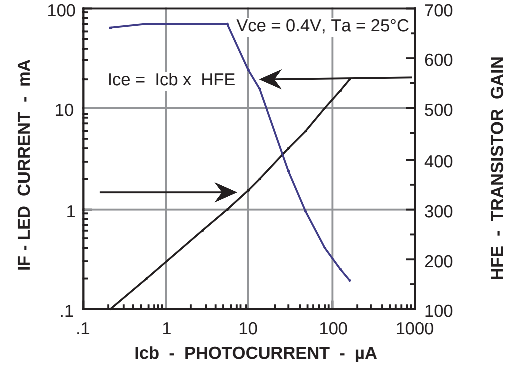


Figure 11. Collector current vs. LED current

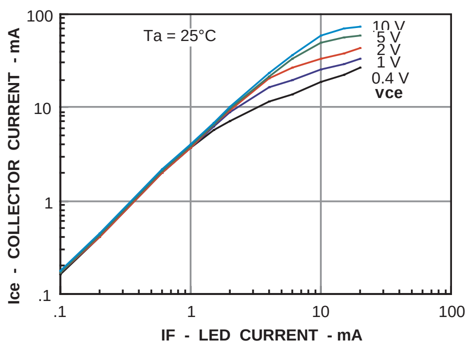


Figure 15. Propagation delay vs. base emitter resistor

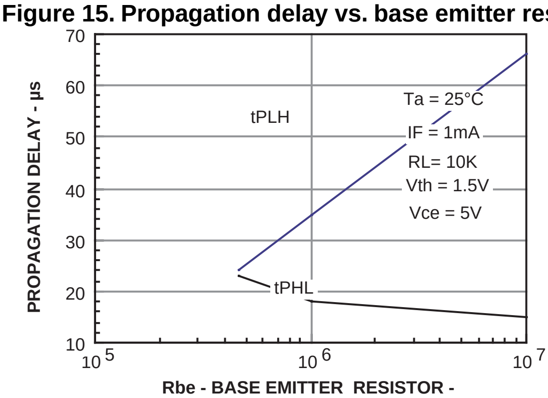


Figure 12. Transistor current gain vs. base current

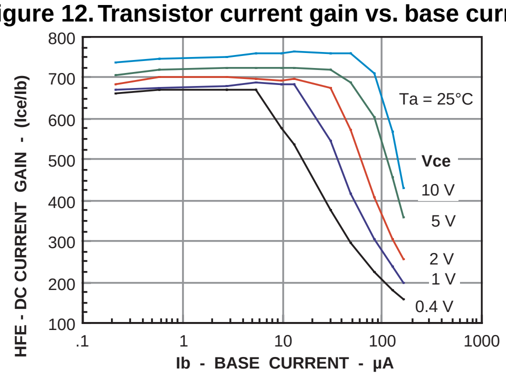


Figure 16. Propagation delay vs. base emitter resistor

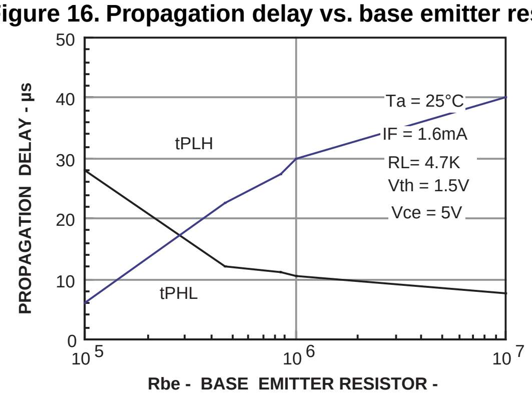


Figure 13. Transfer curve

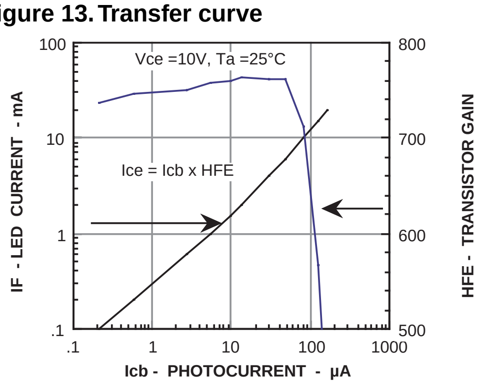


Figure 17. Propagation delay vs. base emitter resistor