UL | CSA | SETI | BABT

MTIL113

6-Pin DIP Optoisolators Darlington Output

The MTIL113 device consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector.

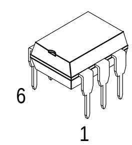
This device is designed for use in applications requiring high collector output currents at lower input currents.

- Higher Sensitivity to Low Input Drive Current
- Meets or Exceeds All JEDEC Registered Specifications

Applications

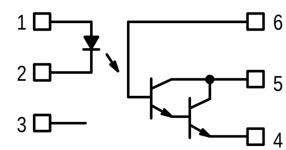
- Low Power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications Equipment
- Portable Electronics
- Solid State Relays

STYLE 1 PLASTIC



STANDARD THRU HOLE

SCHEMATIC



PIN 1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. BASE

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
INPUT LED			
Reverse Voltage	V_R	3	Volts
Forward Current — Continuous	I_F	60	mA
LED Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	100 1.41	mW mW/°C
OUTPUT DETECTOR			
Collector–Emitter Voltage	V_{CEO}	30	Volts
Emitter–Collector Voltage	V_{ECO}	5	Volts
Collector–Base Voltage	V_{CBO}	30	Volts
Collector Current — Continuous	I_C	125	mA
Detector Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	150 1.76	mW mW/°C
TOTAL DEVICE			
Isolation Surge Voltage(2) (Peak ac Voltage, 60 Hz, 1 sec Duration)	V_{ISO}	7500	Vac(pk)
Total Device Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	250 2.94	mW mW/°C
Ambient Operating Temperature Range(3)	T_A	–55 to +100	°C
Storage Temperature Range(3)	T_{stg}	–55 to +150	°C
Soldering Temperature (10 sec, 1/16″ from case)	T_L	260	°C

1. All Motorola 6–Pin devices exceed JEDEC specification and are 7500 Vac(pk).
2. Isolation surge voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
3. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)(1)

Characteristic	Symbol	Min	Typ(1)	Max	Unit
INPUT LED					
Reverse Leakage Current (V_R = 3 V, R_L = 1 M ohms)	I_R	—	0.05	100	µA
Forward Voltage (I_F = 10 mA)	V_F	—	1.34	1.5	Volts
Capacitance (V_R = 0 V, f = 1 MHz)	C	—	1.8	—	pF
OUTPUT DETECTOR (T_A = 25°C and I_F = 0, unless otherwise noted)					
Collector–Emitter Dark Current (V_{CE} = 10 V, Base Open)	I_{CEO}	—	—	100	nA
Collector–Base Breakdown Voltage (I_C = 100 µA, I_E = 0)	$V_{(BR)CBO}$	30	—	—	Volts
Collector–Emitter Breakdown Voltage (I_C = 100 µA, I_B = 0)	$V_{(BR)CEO}$	30	—	—	Volts
Emitter–Collector Breakdown Voltage (I_E = 100 µA, I_B = 0)	$V_{(BR)ECO}$	5	—	—	Volts
DC Current Gain (V_{CE} = 5 V, I_C = 500 µA)	h_{FE}	—	16K	—	—
COUPLED (T_A = 25°C unless otherwise noted)					
Collector Output Current (3) (V_{CE} = 1 V, I_F = 10 mA)	I_C (CTR)(2)	30 (300)	—	—	mA (%)
Isolation Surge Voltage(4,5) (60 Hz ac Peak, 1 Second)	V_{ISO}	7500	—	—	Vac(pk)
Isolation Resistance(4) (V = 500 V)	R_{ISO}	—	10^{11}	—	Ohms
Collector–Emitter Saturation Voltage(3) (I_C = 2 mA, I_F = 8 mA)	$V_{CE(sat)}$	—	—	1.25	Volts
Isolation Capacitance(4) (V = 0 V, f = 1 MHz)	C_{ISO}	—	0.2	—	pF
Turn–On Time(6) (I_C = 50 mA, I_F = 200 mA, V_{CC} = 10 V)	t_{on}	—	0.6	5	µs
Turn–Off Time(6) (I_C = 50 mA, I_F = 200 mA, V_{CC} = 10 V)	t_{off}	—	45	100	µs

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I_C/I_F x 100%.
3. Pulse Test: Pulse Width = 300 µs, Duty Cycle ≤ 2%.
4. For this test, Pins 1 and 2 are common and Pins 4, 5 and 6 are common.
5. Isolation Surge Voltage, V_{ISO}, is an internal device dielectric breakdown rating.
6. For test circuit setup and waveforms, refer to Figures 8 and 9.

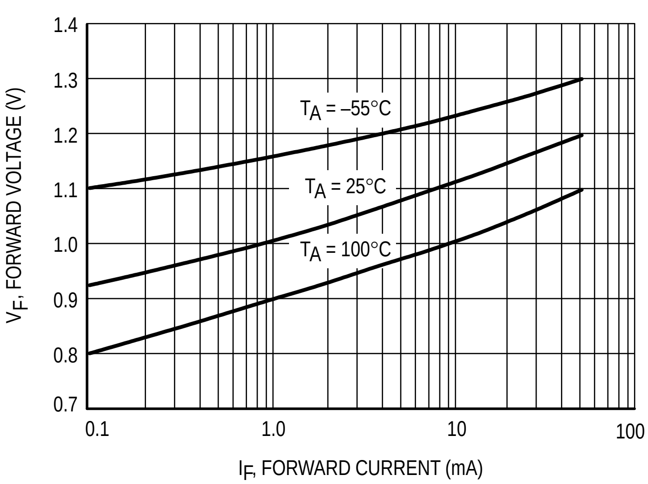


Figure 1. Forward Voltage versus Forward Current

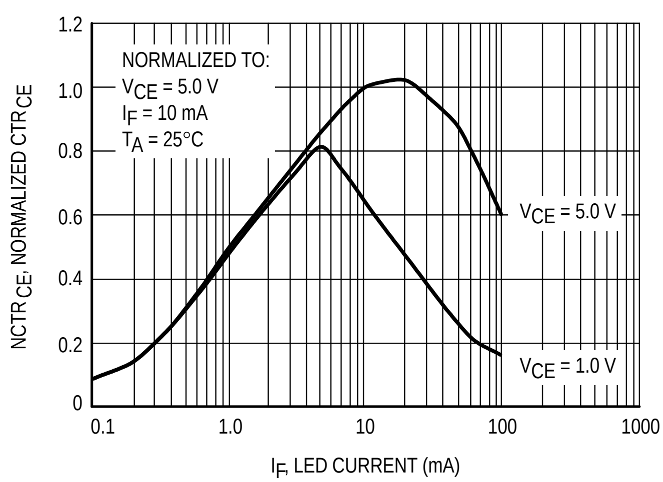


Figure 2. Normalized Non–Saturated and Saturated CTRce versus LED Current

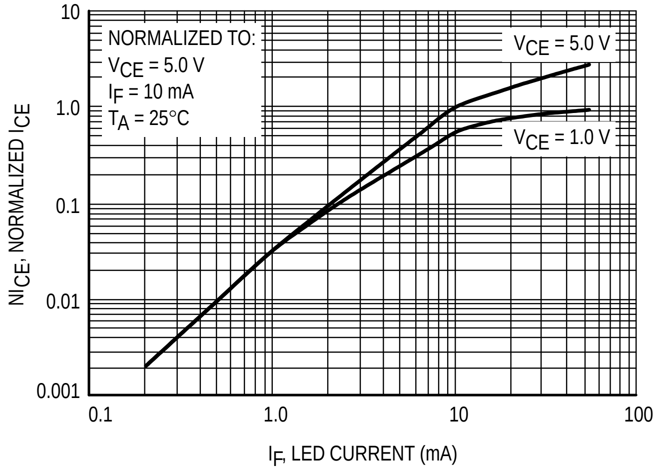


Figure 3. Normalized Non–Saturated and Saturated Collector–Emitter Current versus LED Current

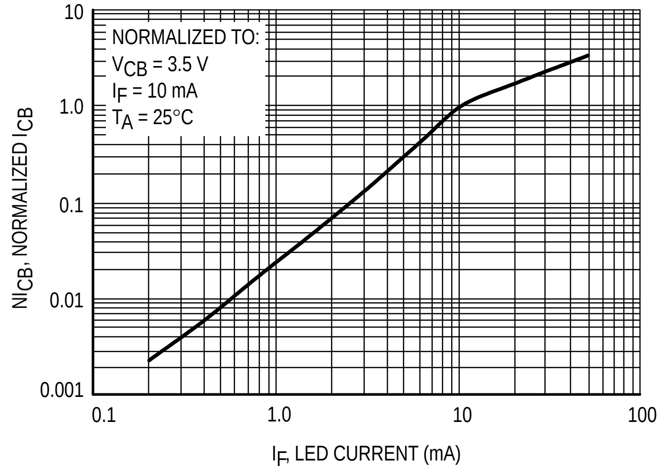


Figure 4. Normalized Collector–Base Photocurrent versus LED Current

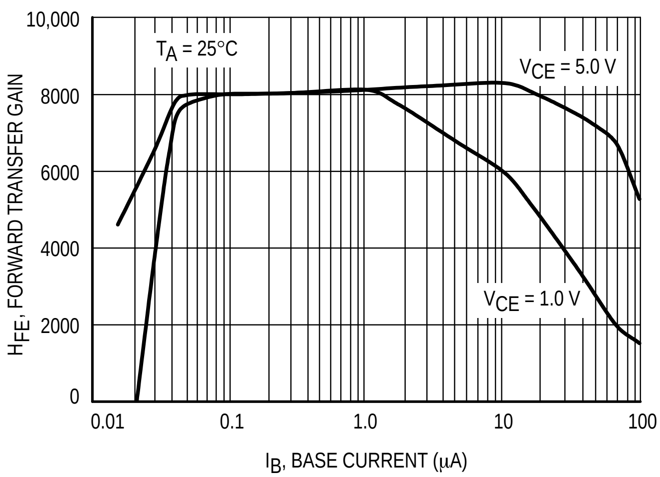


Figure 5. Non–Saturated and Saturated HFE versus Base Current

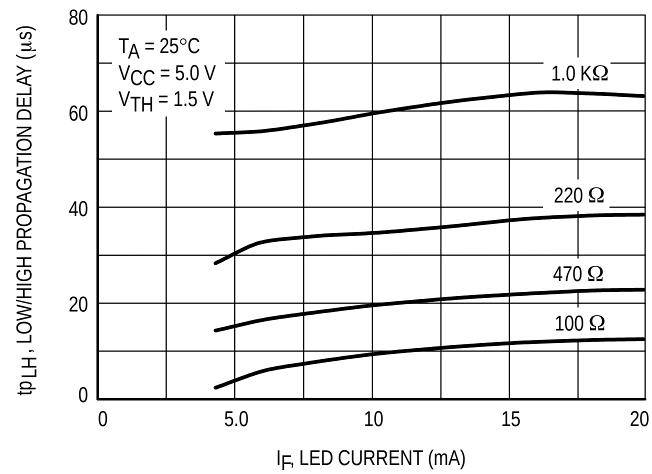


Figure 6. Low to High Propagation Delay versus Collector Load Resistance and LED Current

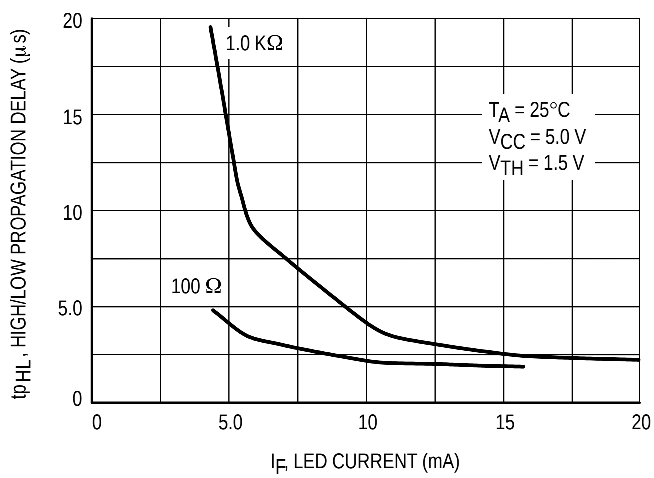


Figure 7. High to Low Propagation Delay versus Collector Load Resistance and LED Current

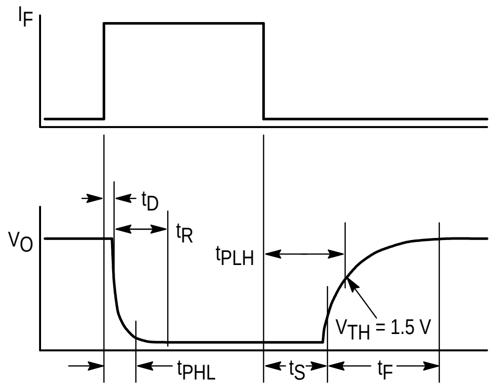


Figure 8. Switching Waveform

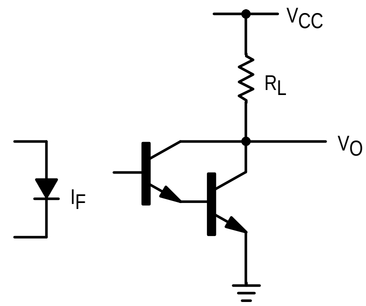
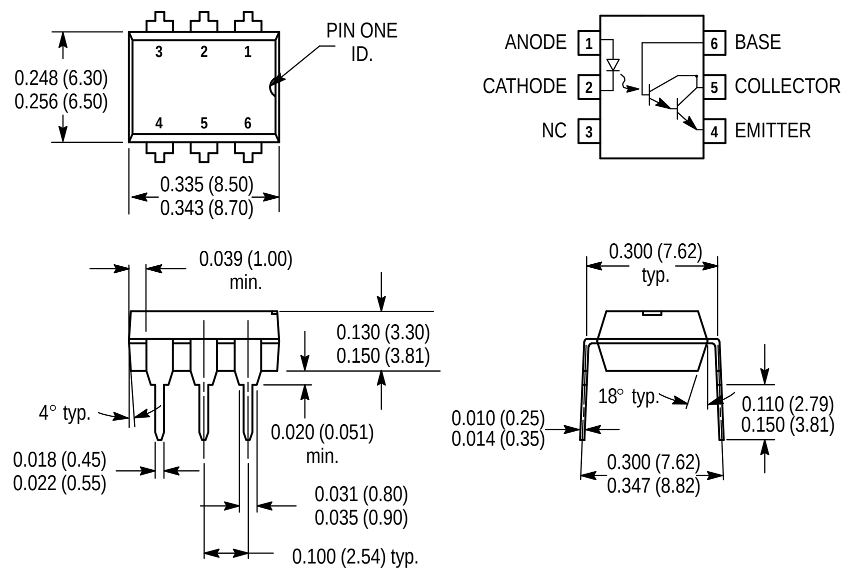


Figure 9. Switching Schematic

Package Dimensions in Inches (mm)



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