66293

PROTON RADIATION TOLERANT
SINGLE/DUAL CHANNEL, LOW-INPUT CURRENT,
OPTOCOUPLER (Electrically similar to 6N140)

MICROPAC
OPTOELECTRONIC PRODUCTS
DIVISION

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Features:

- Proton Radiation Tolerant
- High current transfer ratio: 750% typical
- 1500 Vdc isolation test voltage
- Low input current requirement: 1.6 mA

Applications:

- Telephone ring detection
- Voltage level shifting
- Isolated receiver input
- Communication systems
- Medical systems

DESCRIPTION

The ***66293*** single/dual optocoupler utilizes an 850 nm infrared LED with proven tolerance to proton radiation optically coupled to a high gain photodarlington detector. This unique optocoupler provides high CTR and low leakage current over the full military temperature range (-55° to +125°C). The 66293 is an 8 pin dual-in-line, hermetically sealed package and is available in standard and screened versions or tested to customer specifications.

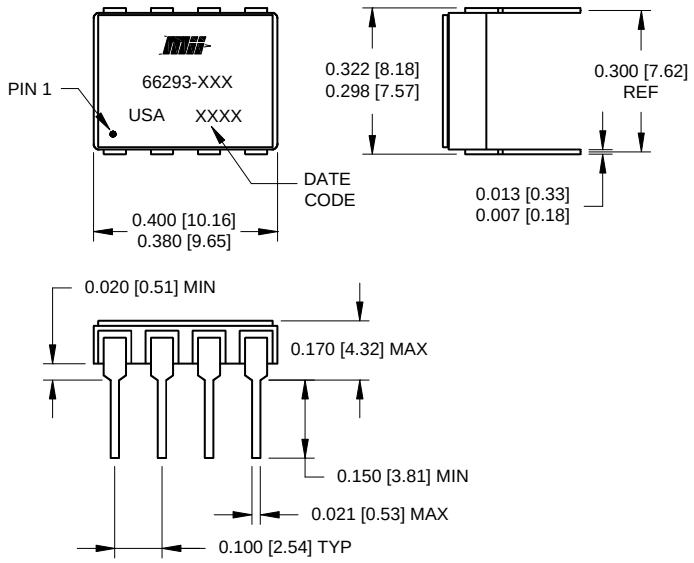
ABSOLUTE MAXIMUM RATINGS

Peak Forward Input Current (each channel) (1 ms duration)	20 mA
Average Forward Input Current (each channel) (Note 1)	10 mA
Reverse Input Voltage	5 V
Output Current - I_O (each channel)	40 mA
Output Power Dissipation (each channel) (Note 2)	50 mW
Supply Voltage - V_{CC} (Note 3)	0.5 to 20 V
Output Voltage - V_O (each channel) (Note 3)	-0.5 to 20 V
Storage Temperature	-65°C to +150°C
Operating Free-Air Temperature Range	-55°C to +125°C
Lead Solder Temperature (10 seconds, 1/16" below seating plane)	260°C

Notes:

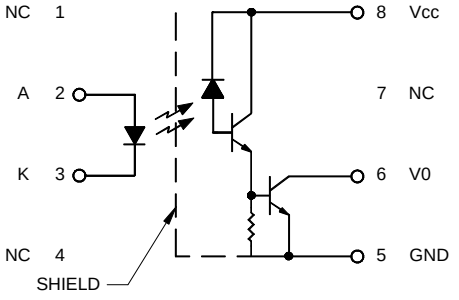
1. Derate I_F at 0.1 mA/°C above 25°C.
2. Collector output power plus one half of the total supply power is total output power. Derate at 0.5 mW/°C above 25°C.
3. The lowest total I_{OH} over temperature is developed by keeping V_{CC} as low as possible, but greater that 2 Volts. The most negative voltage at the detector side should be applied to Pin 5.

Package Dimensions

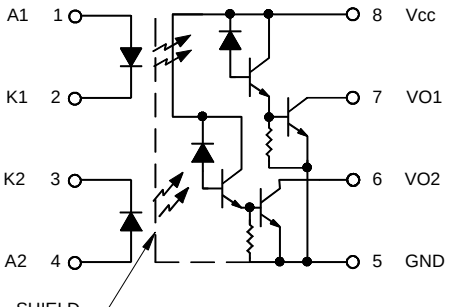


ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]

Schematic Diagram



SINGLE CHANNEL



DUAL CHANNEL

ELECTRICAL CHARACTERISTICS

T_A = -55°C to 125°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Current Transfer Ratio	CTR	300 200	750 400		% %	I_F = 1.6 mA, V_O = 0.4 V, V_{CC} = 4.5 V I_F = 5.0 mA, V_O = 0.4 V, V_{CC} = 4.5 V	1,2 1,2
Logic Low Output Voltage	V_{OL}		0.1 0.2	0.4 0.4	V V	I_F = 1.6 mA, I_{OL} = 1.5 mA, V_{CC} = 4.5 V I_F = 5.0 mA, I_{OL} = 10 mA, V_{CC} = 4.5 V	1
Logic High Output Current	I_{OH}		.005	250	µA	I_F = 2 µA, V_O = V_{CC} = 18 V	1,3
High Level Output Current -XX1 -XX2	I_{CCH}		.01	10 20	µA µA	I_{F1} = 0 mA, V_{CC} = 18 V I_{F1} = I_{F2} = 0 mA, V_{CC} = 18 V	
Low Level Supply Current -XX1 -XX2	I_{CCL}		.01	2 4	mA mA	I_{F1} = 1.6 mA, V_{CC} = 18 V I_{F1} = I_{F2} =1.6 mA, V_{CC} = 18 V	
Input Forward Voltage	V_F		1.4	1.7	V	I_F = 1.6 mA	1
Input Reverse Breakdown Voltage	BV_R	5			V	I_R = 10 µA	1
Input-Output Insulation Leakage Current	$I_{I—O}$			1.0	µA	$V_{I—O}$ = 1500 Vdc, Relative Humidity = 45% T_A = 25°C, t = 5 s	4
Propagation Delay Time To High Output Level	t_{PLH}		14 8	50 30	µs µs	I_F = 1.6mA, V_{CC} = 5.0 V, R_L = 1.5 kΩ I_F = 5 mA, V_{CC} = 5.0 V, R_L = 680 Ω	
Propagation Delay Time To Low Output Level	t_{PHL}		3 2	30 10	µs µs	I_F = 1.6 mA, V_{CC} = 5.0 V, R_L = 1.5 kΩ I_F = 5 mA, V_{CC} = 5.0 V, R_L = 680 Ω	

TYPICAL CHARACTERISTICS

T_A = 25°C, V_{CC} = 5V Each Channel

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Capacitance	C_{IN}		60		pF	V_F = 0, f = 1 MHz, T_A = 25°C	1
Capacitance (Input-Output)	C_{I-O}		1.5		pF	f = 1MHz, T_A = 25°C	1, 5
Input Diode Temperature Coefficient	$\frac{\Delta V_F}{\Delta T_A}$		-1.8		mV/°C	I_F = 1.6 mA	1
Resistance (Input-Output)	R_{I-0}		10^{12}		Ω	$V_{I—O}$ = 500 V, T_A = 25°C	1, 5
Resistance (Input-Input)	R_{I-I}		10^{12}		Ω	$V_{I—I}$ = 500 V, T_A = 25°C	6
Input-Input Insulation Leakage Current	I_{I-I}		0.5		nA	Relative Humidity = 45% $V_{I—I}$ = 500 V, t = 5s	6
Common Mode Transient immunity at High Output Level	CM_H	500	1000		V/µs	V_{CM} = 50 V_{P-P}, V_{CC} = 5.0 V, R_L = 1.5 kΩ, I_F = 0 mA, T_A = 25°C	7,9
Common Mode Transient Immunity at Low Output Level	CM_L	500	1000		V/µs	V_{CM} = 50 V_{P-P}, V_{CC} = 5.0 V, R_L = 1.5 kΩ, I_F = 1.6 mA, T_A = 25°C	8,9

NOTES:

1. Each channel.
2. CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O, to the forward LED input current., I_F, times 100%.
3. I_F = 2 µA for channel under test. For all other channels, I_F = 10 mA.
4. Device considered a two-terminal device.
5. Measured between each input pair shorted together and all output pins shorted together.
6. Measured between each input pair shorted together.
7. CM_H is the maximum tolerable common mode transient to assure that the output will remain in a high logic state (i.e. V_O > 2.0 V).
8. CM_L is the maximum tolerable common mode transient to assure that the output will remain in a low logic state (i.e. V_O < 0.8 V).
9. In applications where dV/dt may exceed 50,000 V/µs (such as static discharge) a series resistor, R_{CC}, should be included to protect the detector IC's from destructively high surge currents. The recommended value is $R_{CC} = \frac{1V}{0.60\ I_F(mA)}$ kΩ.

RECOMMENDED OPERATING CONDITIONS:

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	I_{FL}	0	2	μA
Input Current, High Level	I_{FH}	1.6	5	mA
Supply Voltage	V_{CC}	2.0	18	V

SELECTION GUIDE

PART NUMBER	PART DESCRIPTION
66293-001	Single Channel Commercial
66293-002	Dual Channel Commercial
66293-101	Single Channel, Screened
66293-102	Dual Channel, Screened