66088 SINGLE/DUAL CHANNEL HIGH SPEED OPTOCOUPLERS

OPTOELECTRONIC PRODUCTS DIVISION

T-41-83

FEATURES

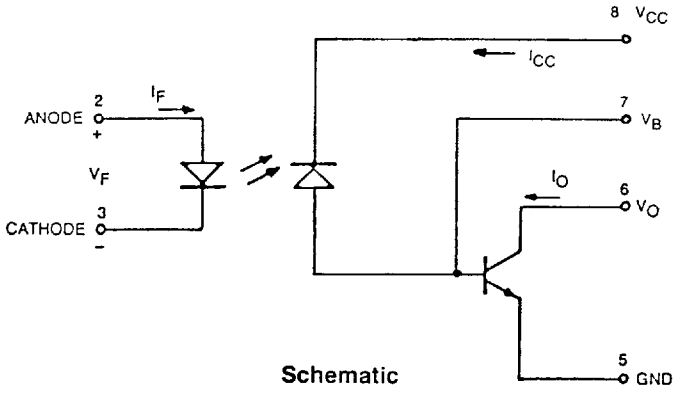
- Hermetically sealed
- Electrically similar to 4N55
- High density packaging
- CTR and I_{OH} guaranteed from −55°C to +125°C ambient temperature range
- Standard high reliability screened parts available
- 1500 Vdc isolation test voltage
- Low output saturation voltage: 0.1V typical
- Low power consumption
- High radiation immunity
- Compatible with selected Hewlett Packard 8 pin optocouplers

APPLICATIONS

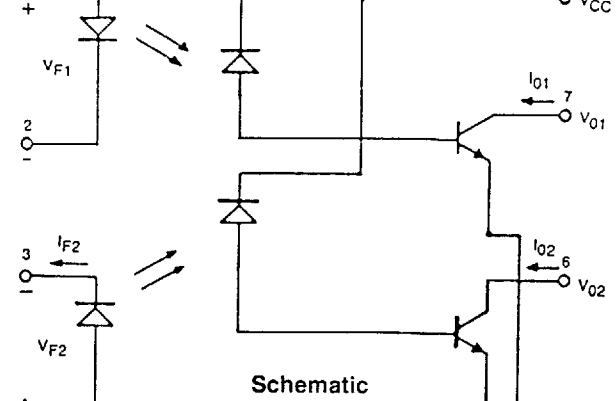
- Microprocessor system interface
- Digital logic ground isolation
- Telephone ring detection
- Level shifting
- Current loop receiver
- Isolation input line receiver
- System test equipment isolation
- Process control input/output isolation

DESCRIPTION

The 66088 single/dual channel optocouplers utilize infrared LEDs optically coupled to high gain photon detectors. These unique optocouplers provide high CTR and low leakage current. The 66088s are available in military temperature range and military temperature with 100% device screening. The devices are built in 8-pin, hermetic, side-brazed package and provide high input to output DC isolation (1500 Vdc minimum).



Schematic
66088-XXX



Schematic
66088-XXX

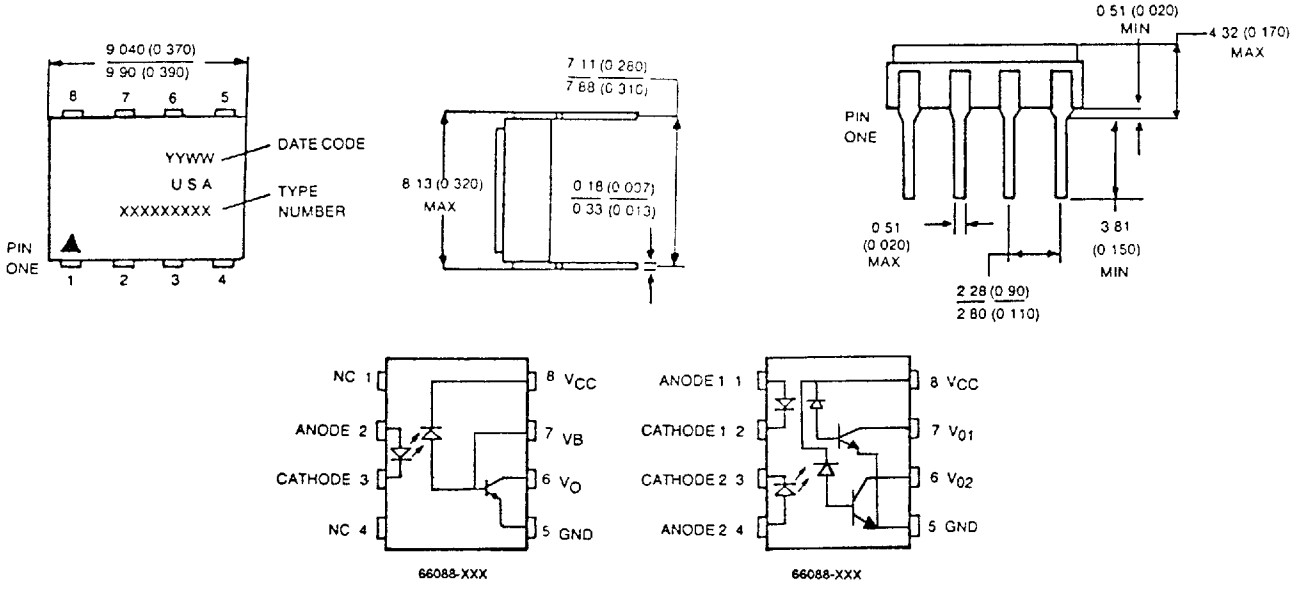
ABSOLUTE MAXIMUM RATINGS

Output Current, I_O (each channel) ..... 8 mA
Output Voltage V_O (each channel) ..... -0.5 to 20 V (1)
Supply Voltage, V_{CC} ..... -0.5 to 20 V (1)
Output Power Dissipation (each channel) ..... 50 mW (2)
Storage Temperature ..... -65 °C to + 150 °C
Operating Temperature ..... -55 °C to + 125 °C
Lead Solder Temperature ..... 260 °C for 10s (1.6 mm below seating plane)
Peak Input Current (each channel _ 1 ms duration) ..... 40 mA
Reverse Input Voltage, V_R (each channel) ..... 5 V
Average Input Current, I_F (each channel) ..... 20 mA (3)
(Derate I_F at 0.1 mA/° *C above 25°C.*)

NOTES:

1. The lowest total I_{OH} over temperature is developed by keeping V_{CC} as low as possible but greater than 2.0 volts. The negative voltage at the detector side should be applied to PIN 5.
2. Collector output power plus one half of the total supply power is total output power for XX2 version. Derate at 0.46 mW/°C above 25°C.
3. Derate I_F at 0.1 mA/°C above 25°C.

Outline Drawing



DIMENSIONS IN MILLIMETERS AND (INCHES)

RECOMMENDED OPERATING CONDITIONS

	SYMBOL	MIN.	MAX.	UNITS
Input Current, Low Level (Each Channel)	I_{FL}		2	μA
Input Current, High Level (Each Channel)	I_{FH}	16	20	mA
Supply Voltage	V_{CC}	2.0	18	V

66088 HIGH SPEED OPTOCOUPLERS, *Continued*

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	15	24		%	I_F = 16 mA, V_O = 0.4 V, V_{CC} = 4.5 V	1,2
Logic Low Output Voltage	V_{OL}		.1	.4	V	I_F = 16 mA, I_{OL} = 2.4 mA, V_{CC} = 4.5 V	
Logic High Output Current	I_{OH}		20	100	μA	I_F = 0, V_O = V_{CC} = 15 V	1
Logic Low Supply Current	I_{CCL}			2	mA	I_F = 16 mA, V_{CC} = 15 V	9
				2	mA	I_{F1} = I_{F2} = 16 mA, V_{CC} = 5 V	10
Logic High Supply Current	I_{CCH}		.010	20	μA	I_F = 0, V_{CC} = 15 V	9
						I_{F1} = I_{F2} = 0, V_{CC} = 15 V	10
Input Forward Voltage	V_F		1.4	1.7	V	I_F = 16 mA, T_A = 25°C	1
Input Reverse Breakdown Voltage	BV_R	5			V	I_R = 10μA, T_A = 25°C	1
Input-Output Insulation Leakage Current	I_{I-O}			1.0	μA	45% Relative Humidity, T_A = 25°C, t = 5 s, V_{I-O} = 1500 Vdc	
Propagation Delay Time To Logic High at Output	t_{PLH}		0.8	1.6	μs	I_F = 16 mA, R_L = 1.9 kΩ, V_{CC} = 5.0 V	
Propagation Delay Time To Logic Low at Output	t_{PHL}		0.8	1.6	μs	I_F = 16 mA, R_L = 1.9 kΩ, V_{CC} = 5.0 V	
Common Mode Transient Immunity at High Output	CM_H	500	1000		V/μs	I_F = 0, R_L = 1.9 kΩ, V_{CM} = 10 V_{p-p}, V_{CC} = 5.0 V, T_A = 25°C	6,8
Common Mode Transient Immunity at Low Output	CM_L	−500	−1000		V/μs	I_F = 16 mA, R_L = 1.9 KΩ, V_{CM} = 10 V_{p-p}, V_{CC} = 5.0 V, T_A = 25°C	7,8

**All typical values are at V_{CC} = 5 V, T_A = 25°C

TYPICAL CHARACTERISTICS T_A = 25°C, V_{CC} = 5 V Each Channel

PARAMETER	SYMBOL	MIN.	TYP.**	MAX.	UNITS	TEST CONDITIONS	NOTE
Resistance (Input-Output)	R_{I-O}		10^{12}		Ω	V_{I-O} = 500 Vdc, T_A = 25°C	1,3,4
Capacitance (Input-Output)	C_{I-O}		1.5		pF	f = 1 MHz, T_A = 25°C	1,3,4
Input-Input Insulation Leakage Current	I_{I-I}		0.5		nA	45% Relative Humidity, T_A = 25°C, t = 5 s, V_{I-I} = 500 Vdc	1,5
Resistance (Input-Input)	R_{I-I}		10^{12}		Ω	V_{I-I} = 500 Vdc, T_A = 25°C	1,5
Capacitance (Input-Input)	C_{I-I}		1		pF	f = 1 MHz, T_A = 25°C	1,5
Temperature Coefficient of Forward Voltage	$\frac{>VF}{>TA}$		−1.8		mV/°C	I_F = 1.6 mA	1
Input Capacitance	C_{IN}		60		pF	f = 1 MHz, V_F = 0, T_A = 25°C	1

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. Device considered a two-terminal device.
4. Measured between each input pair shorted together and all output pins shorted together.
5. Measured between each input pair shorted together, *i.e.*, between pins 1 and 2 shorted together and pins 3 and 4 shorted together, etc.
6. 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).
7. 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).
8. In applications where dV/dt may exceed 50,000 V/μs (such as a static discharge) a series resistor, R_{CC}, should be included to protect the detector ICs from destructively high surge currents. The recommended value is R_{CC} = $\frac{1V}{0.6\ I_F\ (mA)}$ kΩ.
9. Condition applies for XX1 version only.
10. Condition applies for XX2 version only.

66088 HIGH SPEED OPTOCOUPLERS, *Continued*

100% DEVICE SCREENING

TEST INSPECTION	MICROPAC PROCESS SPEC.	MIL-STD-883 METHOD	MIL-STD-883 CONDITION
Internal Visual	PS 90129	2017	
Stabilization Bake	PS 90119	1008	24 hrs. @ 150°C minimum
Temperature Cycle	PS 90117	1010	10 cycles – 65°C, + 150°C minimum
Constant Acceleration	PS 90125	2001	5 KG, Y_1 Axis
Fine Leak	PS 90115	1014	Condition A_1
Gross Leak	PS 90116	1014	Condition C_1
Pre Burn-In Electrical	PS 90131	Device Spec.	
Burn-In	PS 90130	1015	160 hrs. @ 125°C minimum
Final Electrical	PS 90131	Device Spec.	T_A: 25°C + 125°C – 55°C
External Visual	PS 90114	2009	

SELECTION GUIDE

66088-001 . . . . single channel optocoupler tested over full military temperature range

66088-002 . . . dual channel optocoupler tested over full military temperature range

66088-101 . . . single channel optocoupler tested over full military temperature range with 100% device screening

66088-102 . . dual channel optocoupler tested over full military temperature range with 100% device screening

CROSS REFERENCE GUIDE*

MICROPAC #	HEWLETT PACKARD #
66088-001	6N135, 6N136
66088-002	HCPL 2530, HCPL 2531

*Compare data sheets for specific parameters.