

**52458 Dual Current-to-Current Opto-Isolator,  
High Temperature (200°C)**



**Features:**

- Hermetically Sealed Package
- Optically Coupled
- Input/Output Isolation Tested to 1000 VDC
- 200°C Operation

**Applications:**

- Signal Isolation

**DESCRIPTION**

The 52458 is a Current-to-Current Opto-Isolator designed for high temperature applications to 200°C.

Functionally, the device operates as a Current-to-Current Transformer with an output current proportional to the input current. The current transfer ratio is tightly controlled for temperatures from 25°C through 200°C.

**ABSOLUTE MAXIMUM RATINGS**

Continuous Input Current .....	20mA
Storage Temperature Range .....	-65°C to +200°C
Operating Temperature.....	-55°C to +200°C
Lead Solder Temperature for 10 seconds .....	300°C
Reverse Input Voltage .....	6 VDC

**RECOMMENDED OPERATING CONDITIONS:**

Parameter	Symbol	Min.	Max.	Units
Output Voltage	$V_O$		1.0	VDC
Input Current	$I_{F(ON)}$	5	15	mA
Input Voltage	$V_F$	1.1	1.6	VDC
Operating Case Temperature	$T_C$	-55	200	°C

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**ELECTRICAL SPECIFICATIONS**

T<sub>C</sub>= 25°C to +200°C unless otherwise specified

Parameter	Sym.	Min.	Typ.*	Max.	Units	Test Conditions	Notes
Input / Output Forward Voltage	V <sub>F</sub>	—	1.6	2.2	VDC	I <sub>F</sub> = 10 mA	
Input / Output Reverse Breakdown Voltage	V <sub>R</sub>	6	40	—	VDC	I <sub>R</sub> = 10 μA	
Input-Output Leakage	I <sub>I-O</sub>	—	—	1	μA	RH ≤ 45%, t = 5 s V <sub>I-O</sub> = 1000 VDC T <sub>C</sub> = 25°C	1,2
Turn-On Time	t <sub>ON</sub>	—	150		ns	I <sub>F</sub> = 2.5 mA E <sub>O</sub> = OV, shorted NOTE 4	
Turn-Off time	t <sub>OFF</sub>	—	100		ns		
Rise Time	t <sub>R</sub>	—	130		ns		3
Fall Time	t <sub>F</sub>	—	90		ns		
Output Current			80		μA	I <sub>F</sub> = 10 mA	

**Notes:**

1. Input pins are shorted together and output pins are shorted together.
2. Input-output potential applied momentarily, not an operating condition.
3. Rise time is measured from 10% to 90% of output current. Fall time is measured from 90% to 10% of output.
4. Measured values limited by the test Transimpedance circuit.

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Figure 1. Output Current vs. Temperature

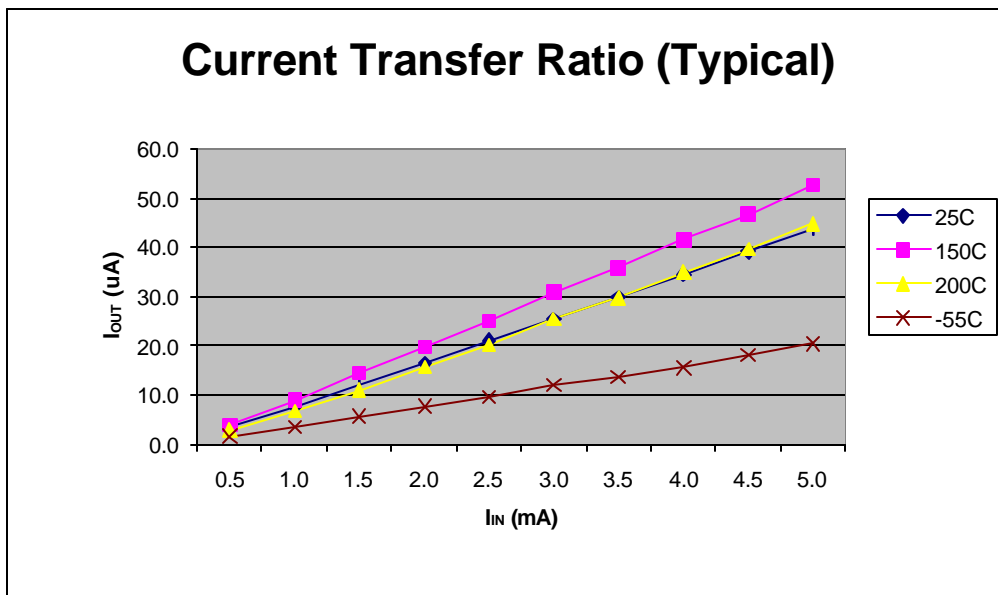
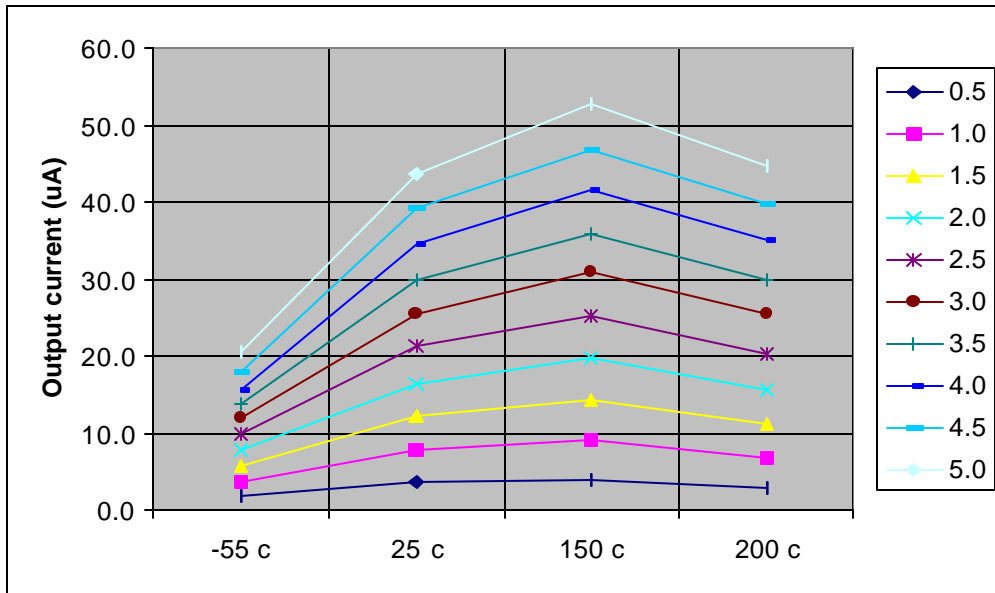


Figure 2. Output Current vs. Input Current (0.5mA – 5mA)

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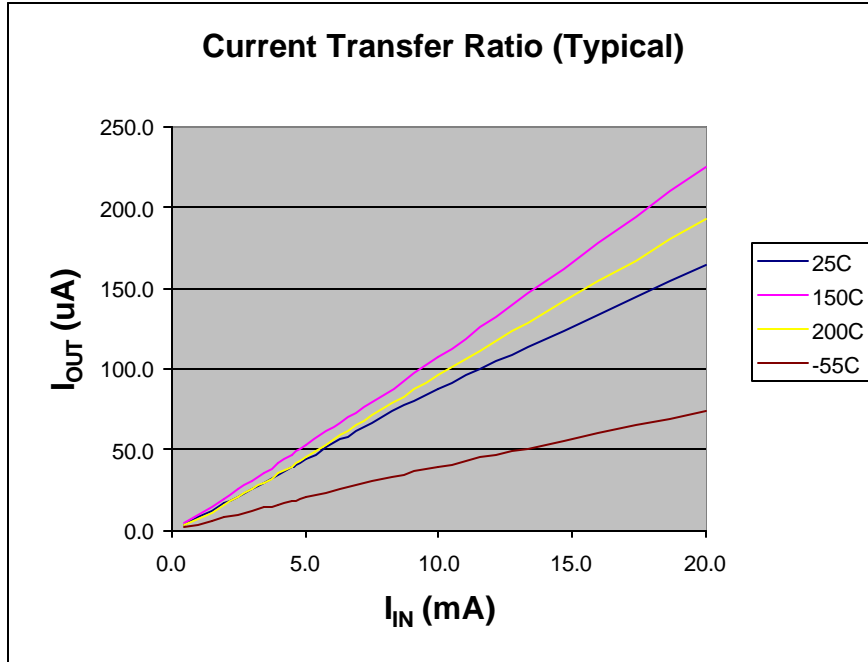


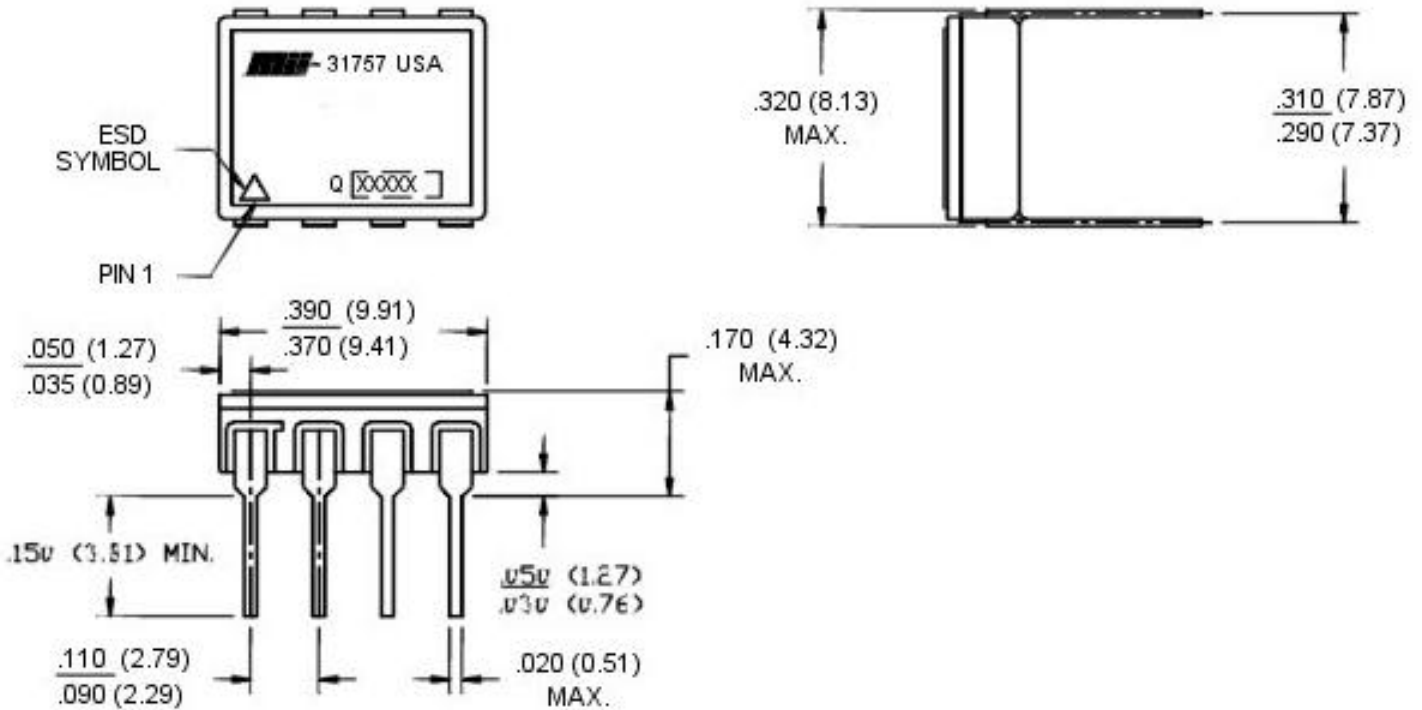
Figure 3. Output Current vs. Input Current (0.5mA – 20mA)

Pin	Function
1	+ in (section 1)
2	- in (section 1)
3	- out (section 2)
4	+ out (section 2)
5	+ in (section 2)
6	- in (section 2)
7	- out (section 1)
8	+ out (section 1)

1. ESD symbol ( $\Delta$ ) indicates pin 1.

Table 1. Pin Outs

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Note: Package is a Ceramic 8 Pin DIP

Figure 4. Case Outline

Application Notes:

52458.01 Isolated Current Monitor.

Figure 1 is a simple, moderately accurate circuit for monitoring an isolated load current. The heart of the circuit is the 52458 Opto Coupler.

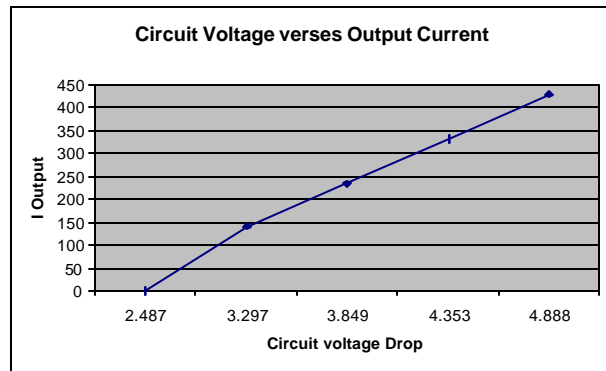
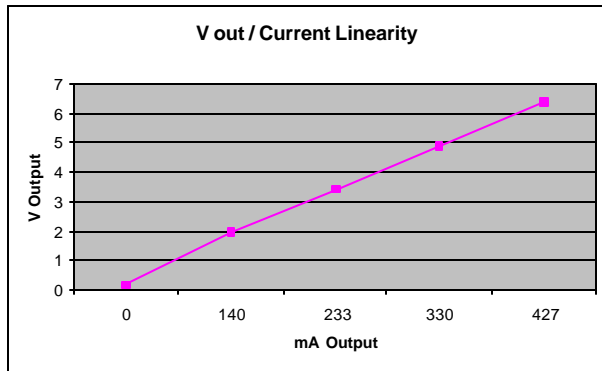
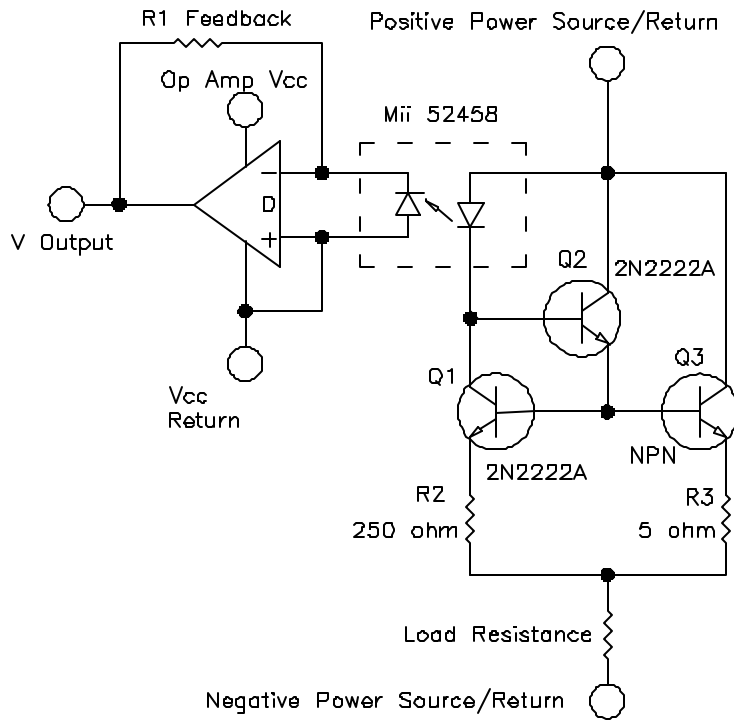
The LED current of the coupler is the sum of 1; the bias current of Q2, Q1 / H<sub>FE</sub> (Q1) and Q3 / H<sub>FE</sub> (Q3) and 2; the collector current of Q1. Q1 and Q3 form a current mirror with an Emitter current ratio of R3 / R2.

A Q3 emitter current of 0.5A represents a 0.010A current at the emitter of Q1 and a total load current of 0.510A.

The OP Amp output voltage is the output current of the 52458 Opto Coupler times the R FEEDBACK value. In this circuit case, 1µA of Detector current produces a 0.1V output.

The total circuit then has a transfer value of (10mA of LED current = 510mA load current) producing 80µA of Detector current x 100k Ohm = 8V output. This gives 8V output for a load current of 510mA or a sensitivity of 1 Volt per 63.75mA.

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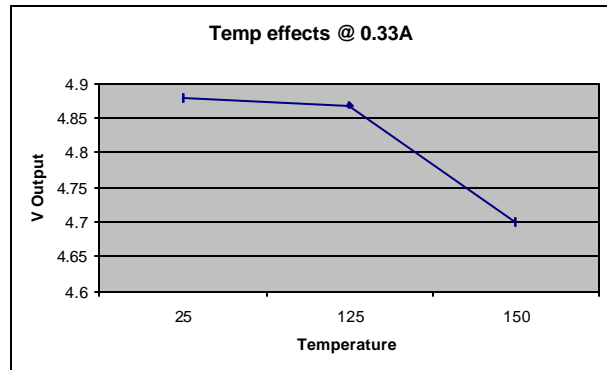
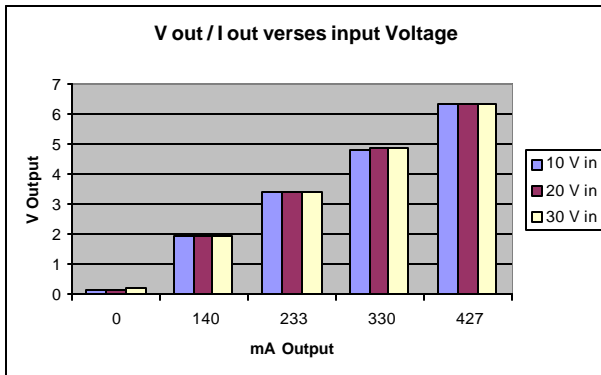
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The following chart illustrates the Optocoupler output as a function of Load current for the circuit of Figure 1.

Vin Volts	I Load mA	Voltage across Power Circuit	V Out
10	0	2.487	.12
10	140	3.297	1.95
10	233	3.849	3.43
10	330	4.353	4.87
10	427	4.888	6.37
30	0	2.517	.19
30	140	3	1.96
30	233	3.837	3.42
30	330	4.376	4.89
30	427	4.876	6.36

The following chart illustrates the effects of temperature on the Coupler output.

Vin Volts	I Load mA	Temp. Deg, C	I Out uA
20	0.33	25	48.8
20	0.33	125	48.7
20	0.33	150	47



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