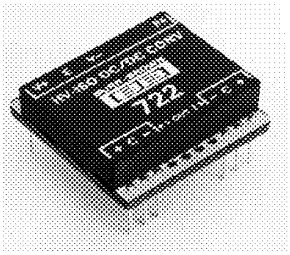
BURR - BROWN®



722

DUAL ISOLATED DC/DC CONVERTER

FEATURES

- DUAL ISOLATED ±5V TO ±16V OUTPUTS
- HIGH BREAKDOWN VOLTAGE: 8000V Test
- LOW LEAKAGE CURRENT: <1μA at 240V/60Hz
- LOW COST PER ISOLATED CHANNEL
- SMALL SIZE: 27.9mm x 27.9mm x 7.6mm (1.1" x 1.1" x 0.3")

APPLICATIONS

- MEDICAL EQUIPMENT
- INDUSTRIAL PROCESS CONTROL
- TEST EQUIPMENT
- DATA ACQUISITION SYSTEMS
- NUCLEAR INSTRUMENTATION

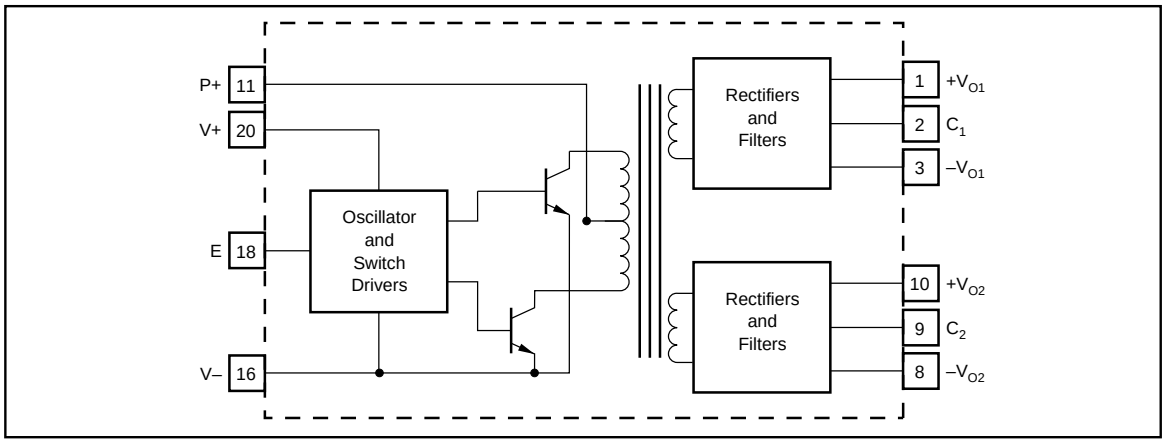
DESCRIPTION

The 722 converts a single 5VDC to 16VDC input into a pair of bipolar output voltages of the same value as the input voltage. The converter is capable of providing a total output current of 64mA at rated voltage accuracy and up to 200mA without damage.

The two output channels are isolated from the input and from each other. They may be connected independently, in series for higher output voltage or in parallel for higher output current, as a single channel isolated DC/DC converter.

Integrated circuit construction of the 722 reduces size and cost. High isolation breakdown voltages and low leakage currents are assured by special design and construction which includes use of a high dielectric strength, low leakage coating used on the internal assembly.

A self-contained 900kHz oscillator drives switching circuitry, which is designed to eliminate the common problem of input current spiking due to transformer saturation or crossover switching.



International Airport Industrial Park • Mailing Address: PO Box 11400 • Tucson, AZ 85734 • Street Address: 6730 S. Tucson Blvd. • Tucson, AZ 85706
Tel: (520) 746-1111 • Twx: 910-952-1111 • Cable: BBRCORP • Telex: 066-6491 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132

PDS-398F Printed in U.S.A. September, 1991

SPECIFICATIONS

ELECTRICAL

T_A = +25°C, V_{IN} = 15VDC, C = 0.47µF, R_1 selected per Typical Performance Curve.

PARAMETER	CONDITIONS	722			722BG			722MG			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
INPUT											
Rated Input Voltage			15			*			*		VDC
Input Voltage Range[1]		5		16	*		*	*		*	VDC
Input Current	Total Output Current = 12mA		50			*			*		mA
	Total Output Current = 64mA		105	120		*	*		*	*	mA
	Total Output Current = 64mA at T_A = +85°C		120			*			*		mA
	Total Output Current = 160mA		—	—		225	275		—	—	mA
Input Ripple[2]	Total Output Current = 12mA		3			*			*		mA, pk
	Total Output Current = 64mA		6			*			*		mA, pk
	Total Output Current = 160mA		—			12			—		mA, pk
ISOLATION											
Test Voltages	Input-to-Output, 5 seconds, min			8000			*			*	Vpk
	Input-to-Output, 1 minute, min			—			—			2500	Vrms
	Channel-to-Channel, 5 seconds, min			5000			*			*	Vpk
Rated Voltages	Input-to-Output, continuous			3500			*			*	V
	Channel-to-Channel, continuous			2000	*		*			*	V
Isolation Impedance	Input-to-Output		10 || 6			*			*		GΩ || pF
Leakage Current[3]	Input-to-Output, 240V, 60Hz			1			*			*	µA
OUTPUT											
Rated Output Voltages[4]	I_{LOAD} = 3mA per Output	15.4		16.2	*		*	*		*	VDC
	I_{LOAD} = 16mA per Output	14.3		16.2	*		*	*		*	VDC
	I_{LOAD} = 40mA per Output	—	—	—	13.7	14.2	16.2	—	—	—	VDC
Output Current	Total of All Outputs			200			*			*	mA
	Any One Output[5]	3		100	*		*	*		*	mA
Load Regulation			[5]			*			*		
Ripple Voltage	I_{LOAD} = 3mA per Output		15			*			*		mVpk
	I_{LOAD} = 16mA per Output		35	100		*	*		*	*	mVpk
	I_{LOAD} = 40mA per Output		—			50			*		mVpk
Tracking Error between Dual Outputs	Balanced Loads		±100			*			*		mVDC
Sensitivity to Input Voltage Changes			1.13			*			*		V/V
Output Voltage Temperature Coefficient	$T_A = T_{SPECIFICATION\ RANGE}$		±0.02			*			*		%/°C
TEMPERATURE											
Specification	$I_{LOAD} \leq$ 16mA per Output	–25		+85	*		*	*		*	°C
	$I_{LOAD} \leq$ 40mA per Output	–25		+60	*		*	*		*	°C
Storage		–55		+125	*		*	*		*	°C
Junction Temperature				+125			*			*	°C

*Specifications same as 722.

NOTES: (1) For ambient temperature above +70°C the input voltage is 12.5V (max). The input voltage remains 16V (max) if case temperature is kept below +85°C. (2) External capacitor across "P+" to "V–" pins and 12" of #24 wire to V_{IN}. (3) Reference UL544, paragraph 27.5, Leakage Current. (4) See "Typical Performance Curves." (5) A minimum output current of 3mA at each output is recommended to maintain output voltage accuracy.

PACKAGE INFORMATION[1]

MODEL	PACKAGE	PACKAGE DRAWING NUMBER
722	20-Pin	102A

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix D of Burr-Brown IC Data Book.

ORDERING INFORMATION

MODEL	PACKAGE	TEMPERATURE RANGE[1]
722	20-Pin	–25°C to +85°C
722BG	20-Pin	–25°C to +85°C
722MG	20-Pin	–25°C to +85°C

NOTE: (1) –25°C to +60°C for $I_{LOAD} \leq$ 40mA per Output.

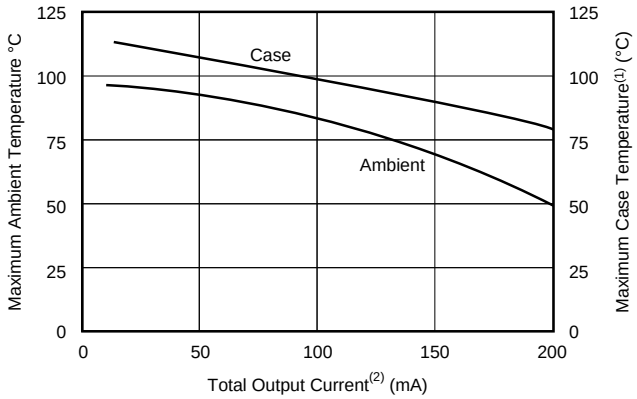
TYPICAL PERFORMANCE CURVES

T_A = +25°C, V_{IN} = 15VDC, C = 0.47µF, R_1 selected per Typical Performance Curve.

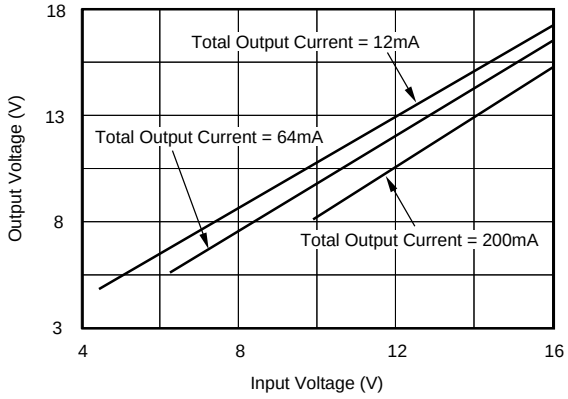
SELECTION OF R_1 OR EXTERNAL VOLTAGE V+
FOR MINIMUM INTERNAL POWER DISSIPATION

		MAXIMUM OUTPUT CURRENT FROM ANY SINGLE OUTPUT		
		<16mA	16mA to 30mA	30mA
Input Voltage (V)	>13	1.3kΩ	820Ω	510Ω
	11 to 13	820Ω	510Ω	200Ω
	9 to 11	510Ω	200Ω	0Ω
	8 to 9	200Ω	0Ω	—
	<8	0Ω	—	—
	$V+_{EXT}$ →	6.5V	7.5V	9.0V

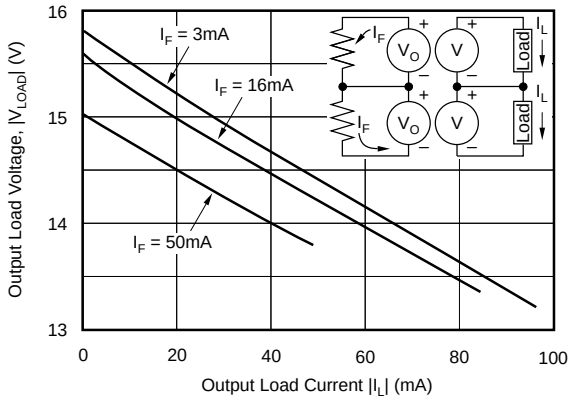
MAXIMUM SAFE OPERATING TEMPERATURE
vs TOTAL OUTPUT CURRENT



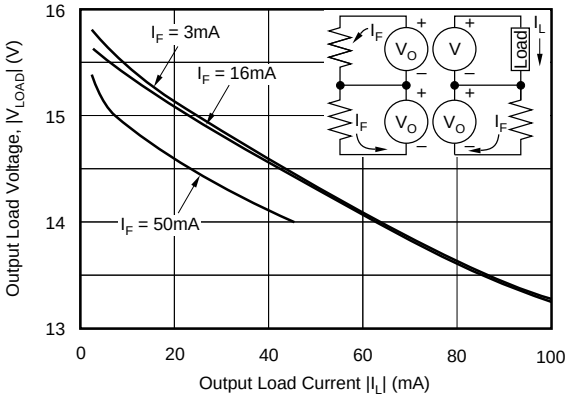
OUTPUT VOLTAGE vs INPUT VOLTAGE



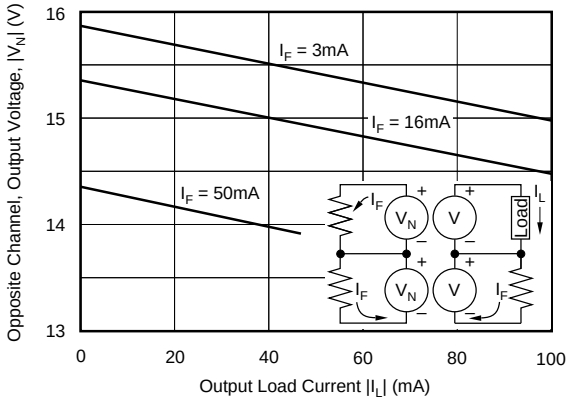
SINGLE-CHANNEL LOAD REGULATION



SINGLE OUTPUT LOAD REGULATION



CHANNEL-TO-CHANNEL INTERACTION

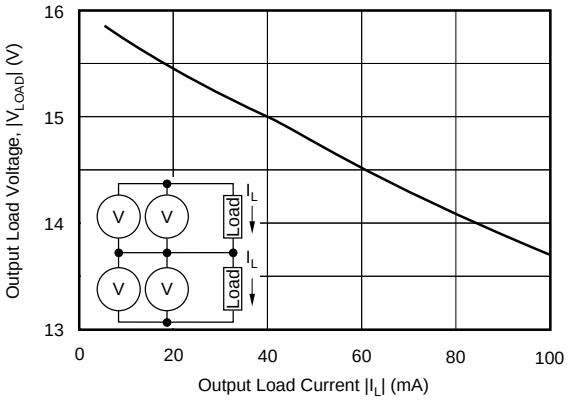


NOTES: (1) Using a 104mm x 19mm x 1.6mm aluminum strip mounted to the bottom of the case with heat sink compound. (2) Total output current is the sum of the currents for each individual output.

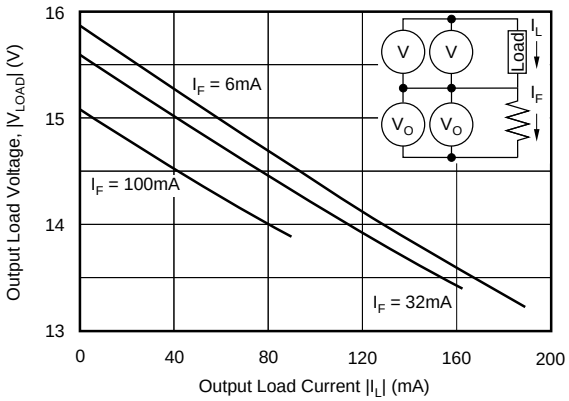
TYPICAL PERFORMANCE CURVES (CONT)

T_A = +25°C, V_{IN} = 15VDC, C = 0.47µF. R_1 selected per Typical Performance Curve.

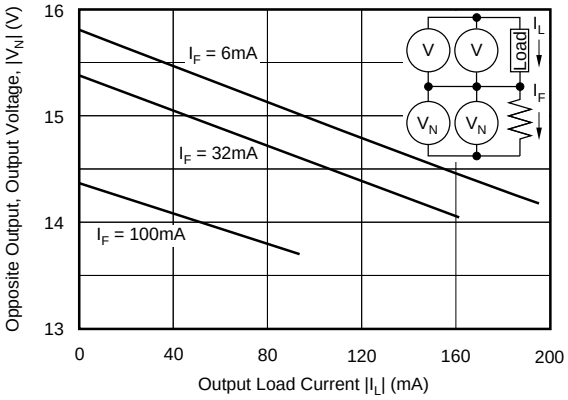
PARALLEL OUTPUT BALANCED LOAD REGULATION



PARALLEL OUTPUT UNBALANCED LOAD REGULATION



OUTPUT-TO-OUTPUT INTERACTION



INSTALLATION AND OPERATING INSTRUCTIONS

Typical application connections for the 722 are shown in Figures 1 and 3. Primary power (V_{IN}) is applied at the "P+" and "V–" terminals. The common or ground for V_{IN} may be connected to either "P+" or "V–"; the only requirement is that "P+" and "V+" must be positive with respects to "V–".

Power for the internal oscillator and switch drivers is derived from the primary power by a voltage dropping resistor, R_1. The value of R_1 as a function of V_{IN} is shown in the Typical Performance Curves section. Alternately, voltage for the "V+" terminal may be obtained from a separate source. "V+" should be +5V to +7.5V positive with respect to "V–." If a separate source is used, the "V+" input must be applied before the "P+" input to avoid possible damage to the unit. "P+" and "V+" must remain positive with respect to "V–" at all times (including transients). If necessary, diode clamps should be put across these inputs.

The "E" pin enables the converter when connected to "V+" and disables it when connected to "V–."

An external capacitor, "C" (0.47µF ceramic), is used to reduce input ripple. It should be connected as close to the "P+" and "V–" pins as practical. Input leads to these terminals should also be kept as short as possible. Since the 722 is not internally shielded, external shielding may be appropriate in applications where RFI at the 900kHz nominal oscillator frequency is a problem.

Each output is filtered with an internal 0.22µF capacitor. Output ripple voltage can be reduced below the specified value by adding external capacitors up to 10µF between each output and its common.

DISCUSSION

OUTPUT CURRENT RATINGS

At rated output voltage accuracy, the 722 is capable of providing 64mA divided among its four outputs(1). A minimum average output current of 3mA is recommended at each output to maintain voltage accuracy.

Output channels(2) may be connected in series or parallel for higher output voltage or current.

ISOLATION CONFIGURATIONS

The fact that the two outputs of the 722 are isolated from the input and from each other allows both two-port and three-port isolation connections.

Figure 1 shows Burr-Brown's 3650 optically coupled isolation amplifier connected in three-port configuration. One of the 722 channels provides power to the 3650's input. The other channel supplies power to the 3650's output. The amplifier's input and output are isolated from each other and the system's power supply common. In this configuration, the 722's channel-to-channel isolation specification applies to the amplifier input-to-output voltage.

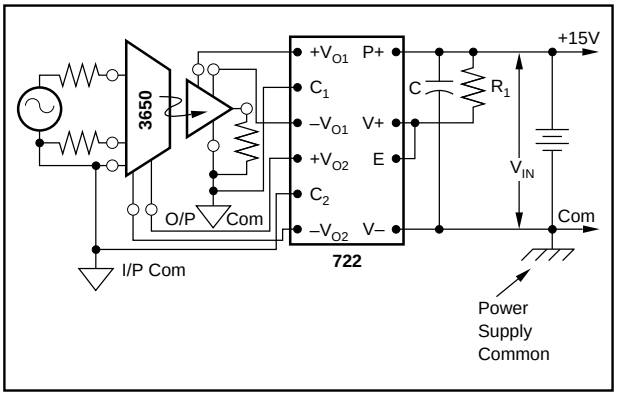


FIGURE 1. Three-Port Isolation.

Figure 3 illustrates how the 722 may provide isolated input power to the input stage of two 3650's connected in the two-port configuration. Power for the output stage is provided by the system +15V and –15V supplies. Input stages are isolated from each other and from the system supply. In this situation, the 722's input-to-output isolation specification applies to the amplifier's input-to-output voltages, while the channel-to-channel 722 specification applies to the voltage existing between "I/P Com #1" and "I/P Com #2."

NOTES: (1) "Output" denotes a single output terminal (+V or –V) and its associated common. (2) "Channel" denotes a pair of outputs (+V and –V) and their associated common.

SHORT CIRCUIT PROTECTION

The circuit in Figure 2 may be added to the input of the 722 to protect it from damage in situations where too much current is demanded from the outputs—such as a short circuit from an output to its common. The circuit limits input current to approximately 150mA for an input voltage of 15VDC (for ß of 2N2219 of 50).

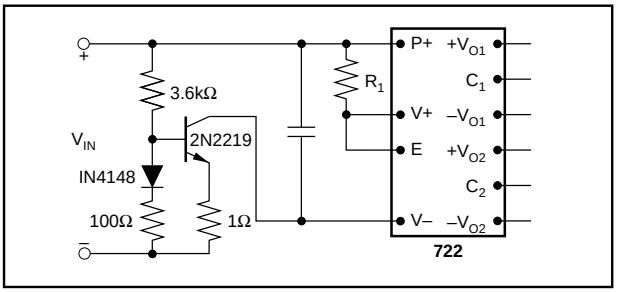


FIGURE 2. Short Circuit Protection.

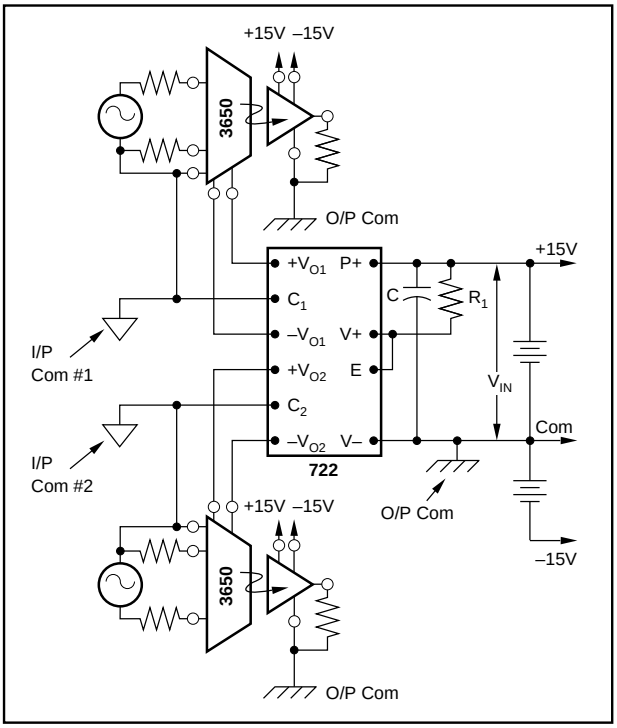


FIGURE 3. Two-Port Isolation with Two 3650's.