6W DUAL DC-DC CONVERTERS

DAC2800D SERIES

M.S.KENNEDY CORP.
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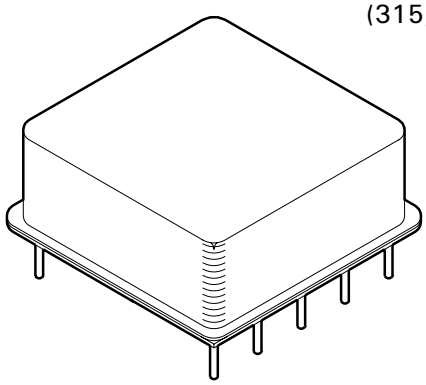
(315) 701-6751



HI-REL DESIGN
- WAVE SOLDERABLE PACKAGE
- ALL CERAMIC CAPACITORS
- SURFACE MOUNT MAGNETICS

FEATURES — DUAL OUTPUT
- REPLACES APEX DHC2812D & DHC2815D
- BOTH OUTPUTS FULLY REGULATED
- NO DERATING — –55°C TO +125°C
- HIGH ISOLATION — 500V
- TRACKING OUPUT V ADJUSTMENT — STANDARD
- REMOTE SHUTDOWN
- 11 TO 50V INPUT WITH 5 WATT OUTPUT
- AVAILABLE WITH ±12V OR ±15V OUTPUTS

DESCRIPTION

The DAC2800D series of DC-DC converters provides the ruggedness reliability and features required to meet the advanced design challenges of today's hi-rel market. This has been accomplished while retaining a power density of 15 W/in^3 and 375 mW/gram of power/package performance. The use of advanced substrate and reflow soldering techniques during construction results in a rugged, cost-effective, and completely solderable package.

The DAC2800D hybrid converter series utilizes all ceramic capacitors, surface mount magnetics, and ultrasonically bonded wires to provide reliable operation at all operating temperatures while surviving G forces of up to 500 G.

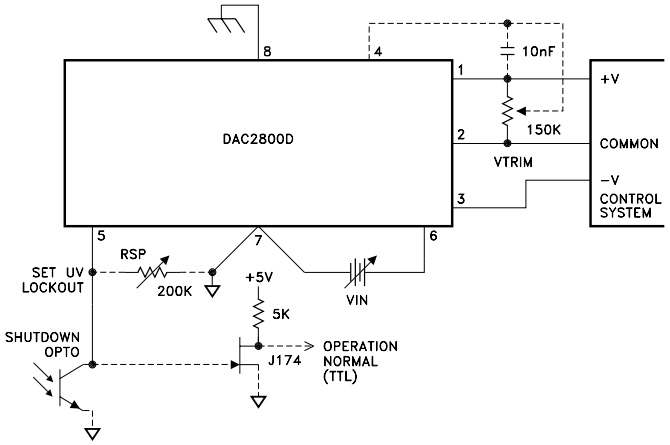
The DAC2800D series has two fully regulated tracking outputs. Standard features include output fault monitoring and/or turn on voltage point programming via the shutdown pin. All three functions may be implemented simultaneously with a minimum of external components. An output voltage adjustment / load compensation pin which adjusts both outputs simultaneously is also standard.

Fault tolerant design protects these converters from most external circuit faults. The + output and output adjust pins will withstand + 25 V while the shutdown pin will withstand + 50 V, protecting the converters from a variety of system or board faults e.g. solder bridges etc. Unique load fault protection circuitry allows this converter to pull up loads having difficult static load line characteristics and allows short term load excursions significantly beyond ratings in most applications.

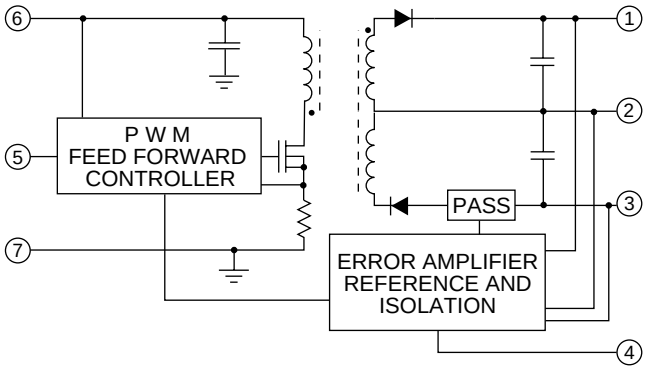
A transformer isolated flyback converter topology operating at a switching frequency of 400 kHz allows operation over a wide input voltage range. Internal filtering of outputs eliminates the need for external capacitors in many applications.

The 8-pin DIP package is hermetically sealed and isolated from the internal circuits. Heat sinking is recommended for full power operation at elevated ambient temperatures.

TYPICAL APPLICATION



BLOCK DIAGRAM



EXTERNAL CONNECTIONS

1	+OUTPUT	8	CASE
2	OUTPUT COMMON		
3	-OUTPUT	7	-INPUT
4	ADJUST/COMP		
5	SHUTDOWN PLUS	6	+INPUT

ABSOLUTE MAXIMUM RATINGS

	DAC2812D	DAC2815D
INPUT VOLTAGE RANGE (Pin 7 to 6 or 5)	50Vdc	50Vdc
INPUT TRANSIENT (Pin 7 to 6)	80V @ 50ms	80V @ 50ms
OUTPUT CURRENT (Continuous)	360mA[4]	288mA[4]
TEMPERATURE, Storage	–65°C, 150°C	–65°C, 150°C
TEMPERATURE, Pin Soldering 10s	300°C	300°C

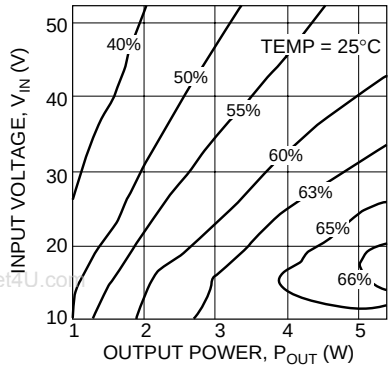
SPECIFICATIONS

PARAMETER	TEST CONDITIONS[1]	DAC2812D MIN	DAC2812D TYP	DAC2812D MAX	DAC2815D MIN	DAC2815D TYP	DAC2815D MAX	UNITS
STEADY STATE CHARACTERISTICS								
INPUT VOLTAGE RANGE	–55°C↔125°C	11	28	50	11	28	50	Vdc
OUTPUT VOLTAGE (+/–)	$+I_o = -I_o = 10\%$	11.9	12	12.1	14.9	15	15.1	Vdc
OUTPUT CURRENT –55°C×125°C	$V_{IN} = 16 \leftrightarrow 40$		±225	360[4]		±180	288[4]	mAdc
	$V_{IN} = 11 \leftrightarrow 50$		±208	333[4]		±167	267[4]	mAdc
OUTPUT POWER –55°C×125°C	$V_{IN} = 16 \leftrightarrow 40$			5.4			5.4	W
	$V_{IN} = 11 \leftrightarrow 50$			5			5	W
EFFICIENCY	$+I_o = -I_o = 100\%$	60	64		61	65		%
LINE REGULATION	$V_{IN} = 11 \leftrightarrow 50$; $+I_o = -I_o = 100\%$		5			5		mV
LOAD REGULATION								
+ (+I_o = 0–160%)	$-I_o = 40\%$[2]		5			5		mV
– (-I_o = 0 – 160%)	$+I_o = 40\%$[2]		20			15		mV
OPERATING TEMPERATURE, CASE		–55		125	–55		125	°C
TEMPERATURE COEFFICIENT (Vout +/–)			0.006			0.006		%/°C
INPUT RIPPLE CURRENT	Bandwidth = 10kHz → 1MHz		340			340		mArms
WITH 1µH SERIES INDUCTANCE	Bandwidth = 10kHz → 1MHz		45			45		mArms
OUTPUT RIPPLE VOLTAGE	Bandwidth = 10kHz → 1MHz		15	60		15	60	mVrms
LOAD CAPACITANCE[3] (PER OUTPUT	$V_{IN} = 16 \leftrightarrow 40$			100			100	µF
OVER –55°C×125°C)	$V_{IN} = 11 \leftrightarrow 50$			50			50	µF
SHORT CIRCUIT DISSIPATION			0.5			0.5		W
QUIESCENT INPUT CURRENT			50	70		50	70	mA
INHIBITED		0.9	1.25	2.5	0.09	1.25	2.5	mA
ISOLATION CHARACTERISTICS (INPUT/OUTPUT/CASE)								
LEAKAGE RESISTANCE	500 Vdc	100			100			MΩ
LEAKAGE CAPACITANCE	10kHz		400	500		400	500	pF
DYNAMIC CHARACTERISTICS								
LINE STEP RESPONSE	$V_{IN} = 16 \leftrightarrow 40$ Vdc							
VOLTAGE CHANGE			200			200		mV
RECOVERY TIME (99%)			250			250		µS
WITH 50 µF OUTPUT CAPACITORS[3]								
VOLTAGE CHANGE			150			150		mV
RECOVERY TIME (99%)			400			400		µS
LOAD STEP RESPONSE	$+I_o = -I_o = 50 \leftrightarrow 100\%$							
VOLTAGE CHANGE			400			400		mV
RECOVERY TIME (99%)			200			200		µS
WITH 50 µF OUTPUT CAPACITORS[3]								
VOLTAGE CHANGE			300			300		mV
RECOVERY TIME (99%)			300			300		µS
START-UP OVERSHOOT	$V_{IN} = 0 \rightarrow 28$ Vdc		0			0		mV
SHUTDOWN DELAY	Pin 5 = > 10 ↔ < 8 Vdc		250	500		250	500	µS
SHUTDOWN RECOVERY	Pin 5 = > 8 ↔ < 10 Vdc		40	60		40	60	mS

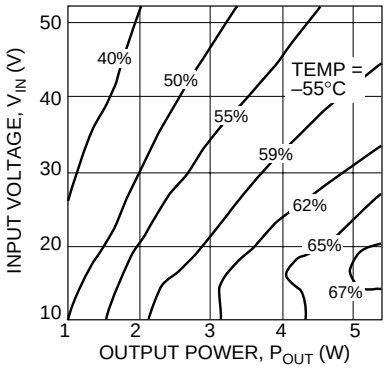
NOTES: 1. Unless otherwise stated T_C = 25°, V_{IN} = 28V, $-I_o = +I_o$ = 100%,
2. Regulation measured on output pins 1/16" from case. I_o = 100% means 2.5 or 2.7 watts.
3. Capacitors should be connected from + to common and – to common only. Capacitance value imbalance should not be more than 4:1.
4. Up to 80% of total load may be drawn from either output.

PACKAGE & THERMAL SPECIFICATIONS	MIN	TYP	MAX	UNITS
WEIGHT		14		GRAMS
TEMPERATURE RISE, junction to case		17	25	°C
TEMPERATURE RISE, ambient		30		°C/W

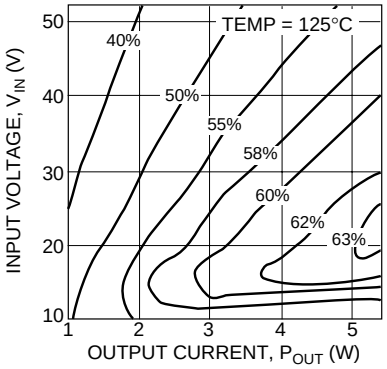
EFFICIENCY CONTOURS



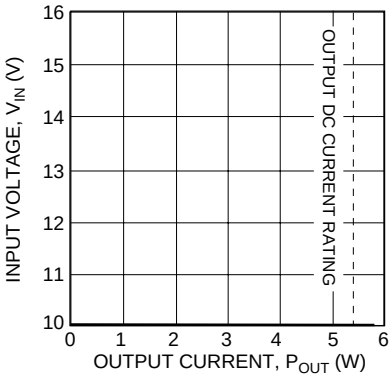
EFFICIENCY CONTOURS



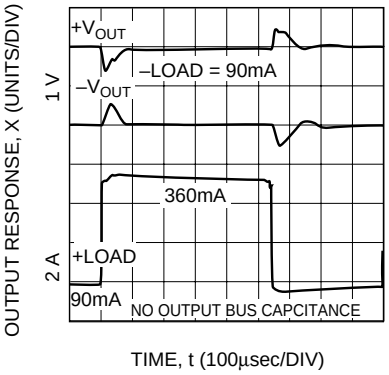
EFFICIENCY CONTOURS



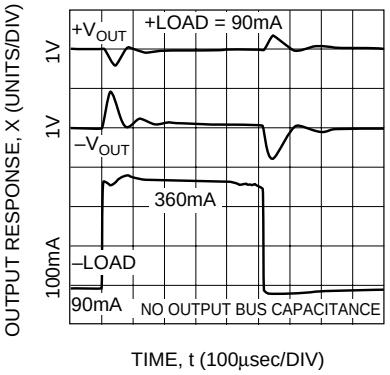
LOW LINE DROP OUT



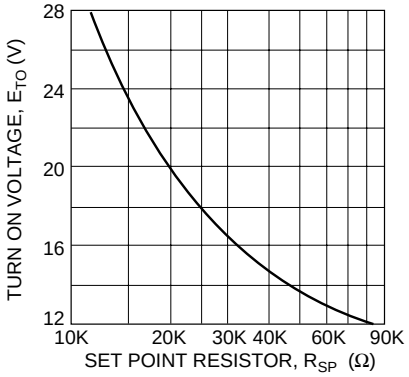
+ LOAD TRANSIENT RESPONSE



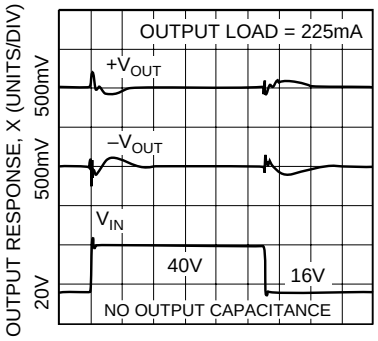
– LOAD TRANSIENT RESPONSE



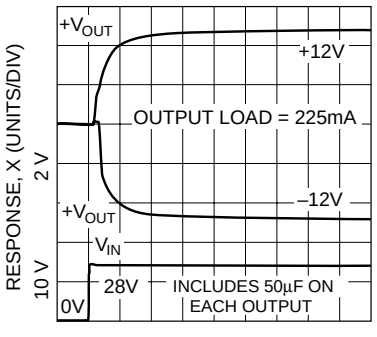
TURN ON THRESHOLD



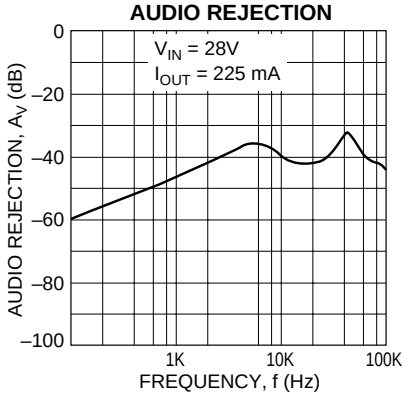
LINE TRANSIENT RESPONSE



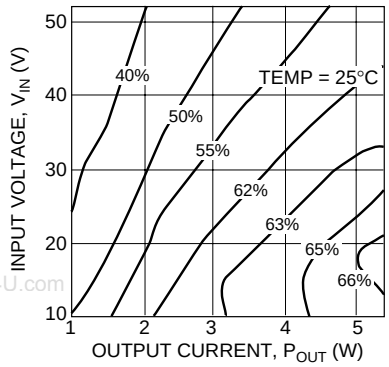
TURN ON RESPONSE



AUDIO REJECTION



EFFICIENCY CONTOURS



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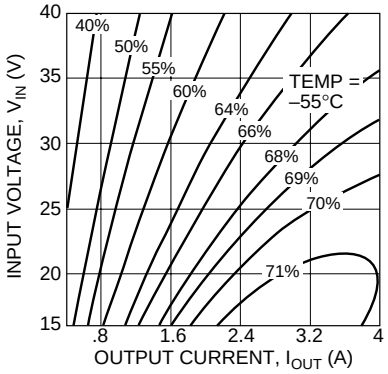
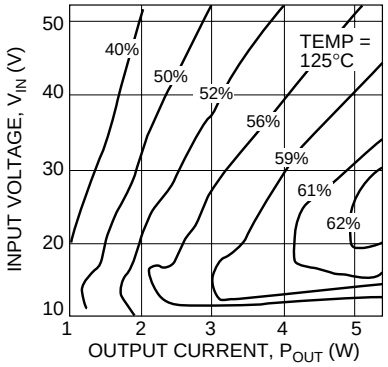
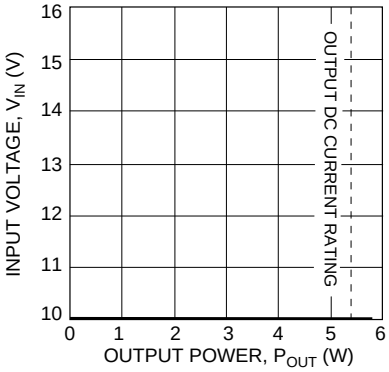


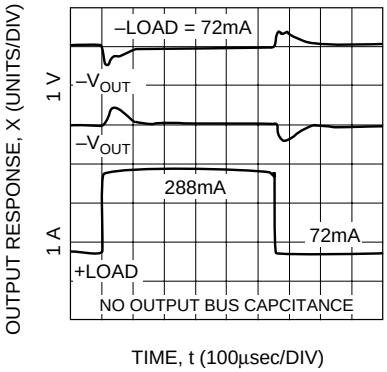
EFFICIENCY CONTOURS



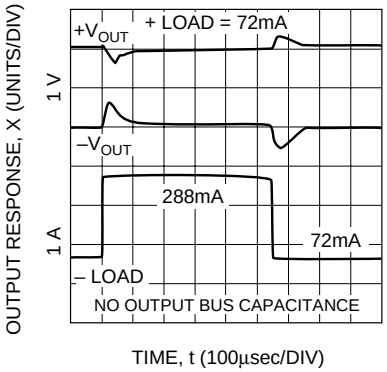
LOW LINE DROP OUT



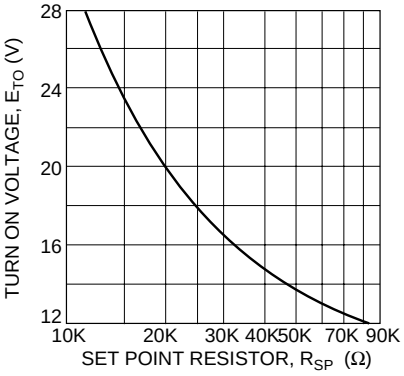
LOAD TRANSIENT RESPONSE



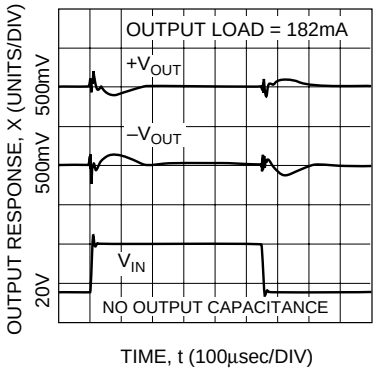
– LOAD TRANSIENT RESPONSE



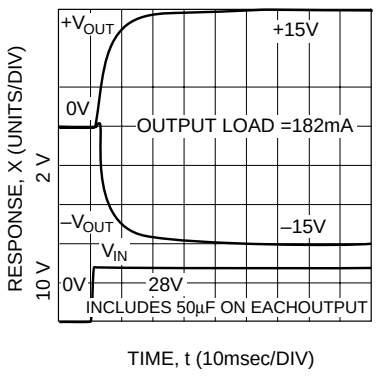
TURN ON THRESHOLD



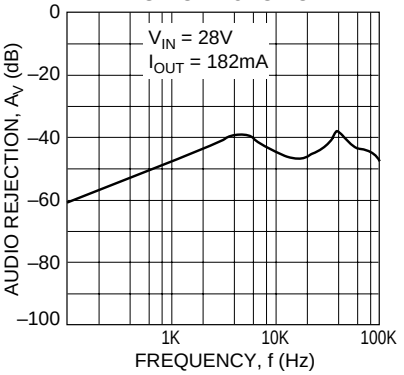
LINE TRANSIENT RESPONSE



TURN ON RESPONSE

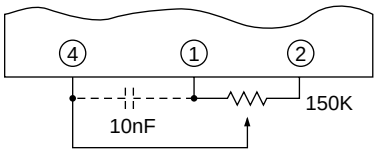


AUDIO REJECTION



OUTPUT ADJUST / COMP

The output voltage of the DAC2800D may be adjusted from 90% to 110% of nominal value by the use of a 150K(potentiometer as shown. Adjustment beyond this range is possible, however certain characteristics of the converter such as but not limited to input voltage range, efficiency, ripple and temperature performance will change. Characterization by the user is recommended in such applications.



Adjust/comp (pin 4) may be driven by external circuitry referenced to pin 2 (-output) if desired. Grounding pin 4 causes voltage to increase (25% typically) while driving pin 4 above 1.3 V causes output voltage to decrease. Pin 4 may be driven negative without damage, however the resultant increase in converter output voltage should be considered. Pin 4 may be driven through 10K(or more if connection of the comp function is also required.

The comp function of pin 4 allows load transient response to be tailored to suit specific application requirements. This feature may be utilized by connecting a 10nF or less capacitor between pins 4 and 1.

SHUTDOWN PLUS

Pin 5 is used for remote shutdown, output fault detection, and/or setting the input voltage point at which the converter will turn on as shown in the typical application diagram. No connection to pin 5 is necessary for normal operation of the converter. Pin 5 is referenced to pin 7 (-input).

Shutdown may be implemented by simply connecting pin 5 to an open collector logic output or switch rated at 2.5 mA, 25 Vdc or higher.

Input voltage turn on point is programmed with a single resistor from pin 5 to 7. An input turn on/off hysteresis (typically 3.5% of Vin) will be observed. This should be considered when making or verifying set point adjustment. The value of the setpoint resistor may be determined by the following:

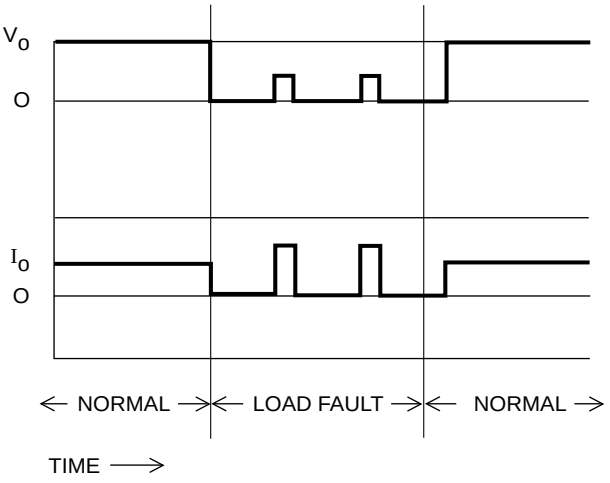
$$R = \frac{210 * 10^3}{E_{TO} - 9.5} \quad (+/- 10\% \text{ accuracy at } 25^{O}C)$$

Set point temperature coefficient is typically + 400ppm/^{O}C

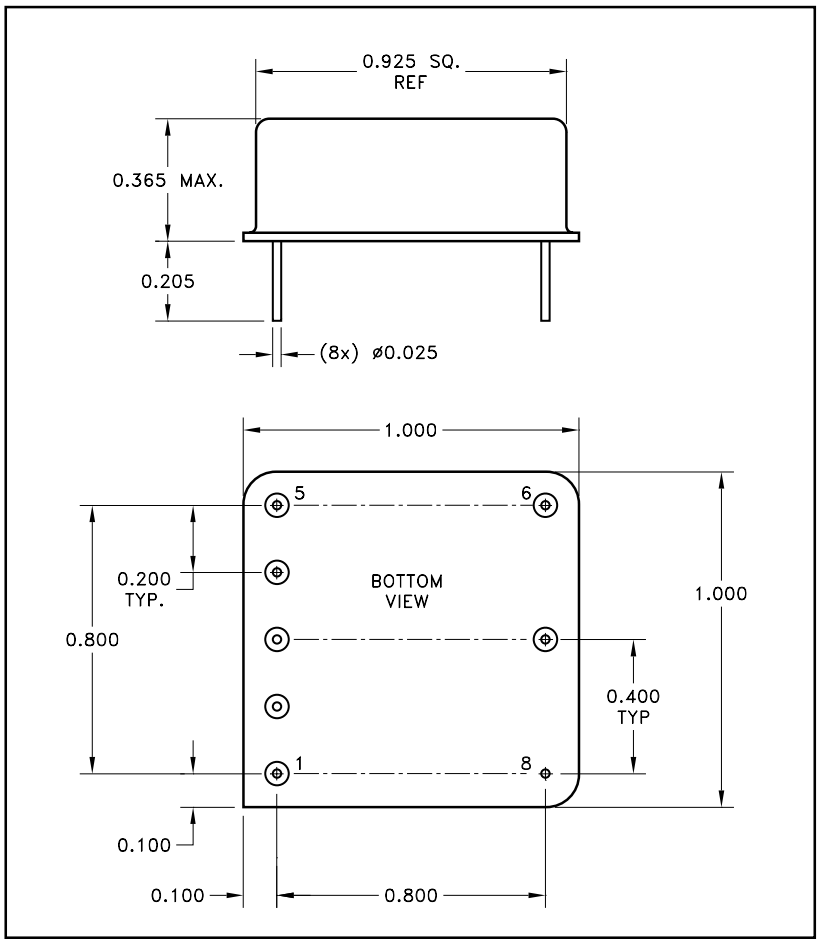
Output fault monitoring is accomplished by observing pin 5 with a high impedance monitoring circuit. Pin 5 voltage drops from over 10 V to below 1 V when a load fault causes the converter's fault protection circuitry to activate. It will remain low for at least 100 mS and return high. If the load fault is still present pin 5 will return low and the cycle will repeat. A resistor > 400K(from pin 5 to 7 provides pull down for pin 5 if there is no input setpoint programming resistor already in place.

LOAD FAULT RESPONSE

The DAC2800D series of DC-DC converters share load fault philosophies. Load fault conditions include short-circuit and severe overload conditions. The DAC2800D converter series responds to load faults by turning off all power conversion circuits for 250 mS and then attempting to restart for 10 mS (typical). The net "on" duty factor during a fault is very low resulting in low converter dissipation and immunity from overheating at 125°C. Current beyond rated can flow into the load at startup time. This allows the converter to bring up capacitive and other difficult load types more reliably than competing converters.



MECHANICAL SPECIFICATIONS



NOTE: ALL DIMENSIONS ARE ±0.010 INCHES UNLESS OTHERWISE LABELED.
ESD Triangle indicates Pin 1.

ORDERING INFORMATION

DAC2812D_

SCREENING
BLANK = INDUSTRIAL; E = EXTENDED RELIABILITY;
H = CLASS H
DUAL OUTPUT
OUTPUT VOLTAGE
12 = ±12V; 15 = ±15V
NOMINAL INPUT VOLTAGE
GENERAL PART NUMBER

The above example is an industrial grade ±12V dual output converter

M.S. Kennedy Corp.
4707 Dey Road, Liverpool, New York 13088
Phone (315) 701-6751
FAX (315) 701-6752
www.mskennedy.com