100-W 8.5-A Programmable Isolated DC/DC Converter

EXCALIBUR

SLTS128A

(Revised 9/4/2001)

Features

- 18V to 36V Input Range
- -40° to +100°C Operating Temp
- 1500 VDC Isolation
- 88.5% Efficiency
- Programmable Output Voltage 6.5V to 17.5V
- Remote On/Off
- Differential Remote Sense
- N+1 Current Sharing
- Over-Current Protection
- Over-Temperature Protection
- Over-Voltage Protection
- Solderable Copper Case

Description

The PT4475 Excalibur™ module combines state-of-the-art power conversion technology with un-paralleled flexibility. Operating off a standard 24V telecom input, the PT4475 provides a full 100W output at load currents up to 8.5A, and over the programmable output voltage range of 6.5V to 17.5V.

The PT4475 features high efficiency, ultra-fast transient response, and the capability for true N+1 current sharing. This product also includes output short circuit and over-temperature protection.

Standard Application
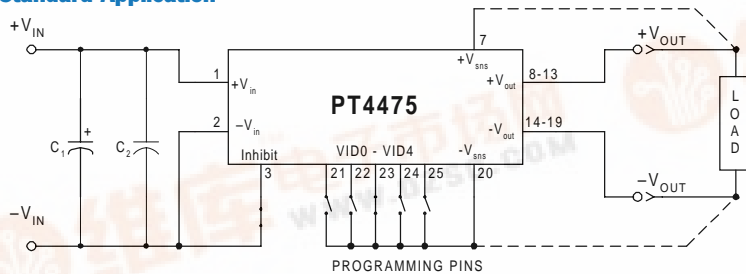
- C_1 = Optional 33µF, 100V electrolytic capacitor
- C_2 = Optional 1µF, 100V ceramic capacitor
- Programming pins, VID0–VID4, are shown configured for Vo =12.0V
- For normal operation, pin 3 (Inhibit) must be connected to –Vin.
- For operation in N+1 configuration, consult the related application note.
- Pins 6 & 26 are used for N+1 configurations only.

Specifications

Characteristics (T$_a$=25°C unless noted)	Symbols	Conditions (V$_{in}$=24V, V$_o$=12.0V unless noted)	Min	Typ	Max	Units
Output Current	I$_o$	Over V$_{in}$ range (100W max)	0.1	—	8.5 [1]	A
Current Limit	I$_{cl}$	V$_{in}$ = 18V	—	10	—	A
Current Sharing		Single line referenced to –V$_{sense}$	—	—	±10	%
Input Voltage Range	V$_{in}$	I$_o$ = 0 to I$_o$max	18	24	36	V
Output Voltage Tolerance	ΔV$_o$	Over V$_{in}$ range, I$_o$ =I$_o$max T$_a$ =-40 to +100°C case	—	±1.0	±2.0	%V$_o$
Line Regulation	Reg$_{line}$	Over V$_{in}$ range @ max I$_o$	—	±0.1	±1.0	%V$_o$
Load Regulation	Reg$_{load}$	0 to 100% of I$_o$ max	—	±0.5	±1.0	%V$_o$
V$_o$ Ripple/Noise	V$_n$	I$_o$ =I$_o$max	—	120	150	mV$_{pp}$
Transient Response	t$_{tr}$	50% to 75% I$_o$max @ 0.1A/µs V$_o$ over/undershoot (no ext caps)	— —	N/A 1.0	— —	µSec %V$_o$
		50% to 100% I$_o$max @1.0A/µs V$_o$ over/undershoot (no ext. caps)	— —	200 5	— —	µSec %V$_o$
V$_o$ Rise Time	V$_{otr}$	At turn-on	—	—	10	mSec
Efficiency	η	I$_o$ =5A	—	89	—	%
Switching Frequency	f$_o$	—	—	300	—	kHz
Remote On/Off	Off On	referenced to -V$_{in}$	+2.5 -0.5	— —	+75.0 +0.8	VDC
Over-Voltage Protection	OVP	Shutdown and latch off	—	125	—	%V$_o$
Isolation	—	—	1500	—	—	VDC
Operating Temperature Range	T$_c$	Measured at center of case	–40	—	+100	°C
Over-Temperature Shutdown	OTP	Case temperature - Auto reset	—	+110	—	°C
Storage Temperature	T$_s$	—	-40	—	+125	°C
Reliability	MTBF	Per Bellcore TR-332 50% stress, t =40°C, ground benign	1.7	—	—	10^6 Hrs
Mechanical Shock	—	Per Mil-STD-883D, Method 2002.3, 1mS, Half-sine, mounted to a fixture	—	500	—	G's
Mechanical Vibration (Mil-STD-883D, 20-2000Hz)	—	Vertical (Suffix N) Horizontal (Suffixes A, C)	— —	10 [2] 20 [2]	— —	G's
Weight	—	—	—	90	—	grams

Notes: [1] The maximum output current is limited to 8.5A or 100/V$_{OUT}$, Whichever is less.
[2] Only the case pins on the through-hole package types (suffixes N & A) must be soldered. For more information see the applicable package outline drawing.

**100-W 8.5-A Programmable
Isolated DC/DC Converter**

Pin-Out Information

Pin	Function	Pin	Function
1	$+V_{in}$	14	$-V_{out}$
2	$-V_{in}$	15	$-V_{out}$
3	Inhibit	16	$-V_{out}$
4	Do not connect	17	$-V_{out}$
5	Do not connect	18	$-V_{out}$
6	Sync	19	$-V_{out}$
7	$+V_{sense}$	20	$-V_{sense}$
8	$+V_{out}$	21	VID0
9	$+V_{out}$	22	VID1
10	$+V_{out}$	23	VID2
11	$+V_{out}$	24	VID3
12	$+V_{out}$	25	VID4
13	$+V_{out}$	26	Share

Programming Information

VID3	VID2	VID1	VID0	VID4=1 Vout	VID4=0 Vout
1	1	1	1	10.0	6.5
1	1	1	0	10.5	6.75
1	1	0	1	11.0	7.0
1	1	0	0	11.5	7.25
1	0	1	1	12.0	7.5
1	0	1	0	12.5	7.75
1	0	0	1	13.0	8.0
1	0	0	0	13.5	8.25
0	1	1	1	14.0	8.5
0	1	1	0	14.5	8.75
0	1	0	1	15.0	9.0
0	1	0	0	15.5	9.25
0	0	1	1	16.0	9.5
0	0	1	0	16.5	9.75
0	0	0	1	17.0	10.0
0	0	0	0	17.5	10.25

Logic 0 = Pin 20 potential (remote sense gnd)
Logic 1 = Open circuit (no pull-up resistors)
VID4 may not be changed while the unit is operating.

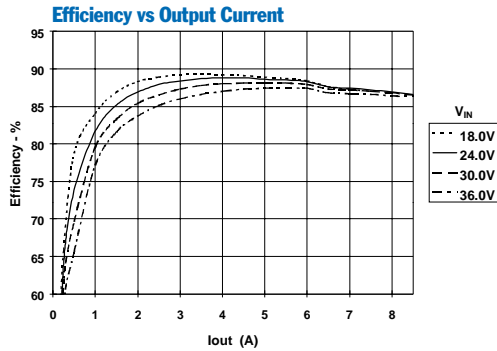## Ordering Information

PT4475☐ =+6.5V to 17.5V

PT Series Suffix **(PT1234*x*)**

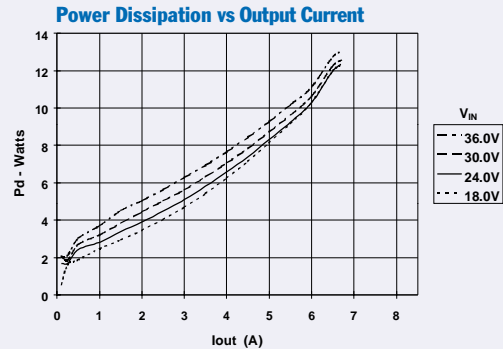| Case/Pin Configuration	Order Suffix	Package Code
Vertical	**N**	(EKD)
Horizontal	**A**	(EKA)
SMD	**C**	(EKC)

(Reference the applicable package code drawing for the dimensions and PC board layout)
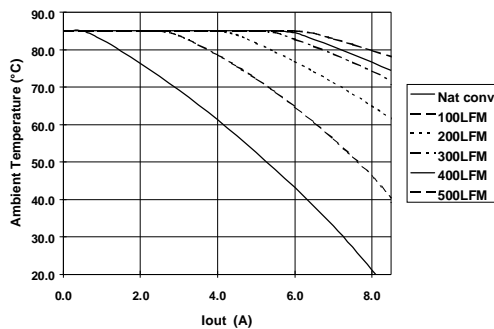
T Y P I C A L   C H A R A C T E R I S T I C S

PT4475, V_o =12.0V (See Note A)

Efficiency vs Output Current

Power Dissipation vs Output Current
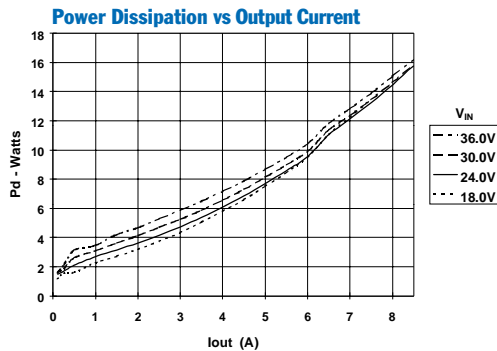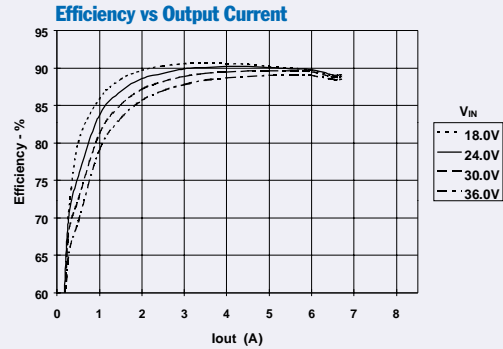
Safe Operating Area, V_o =12V (See Note B)

PT4475, V_o =15.0V (See Note A)

Efficiency vs Output Current

Power Dissipation vs Output Current

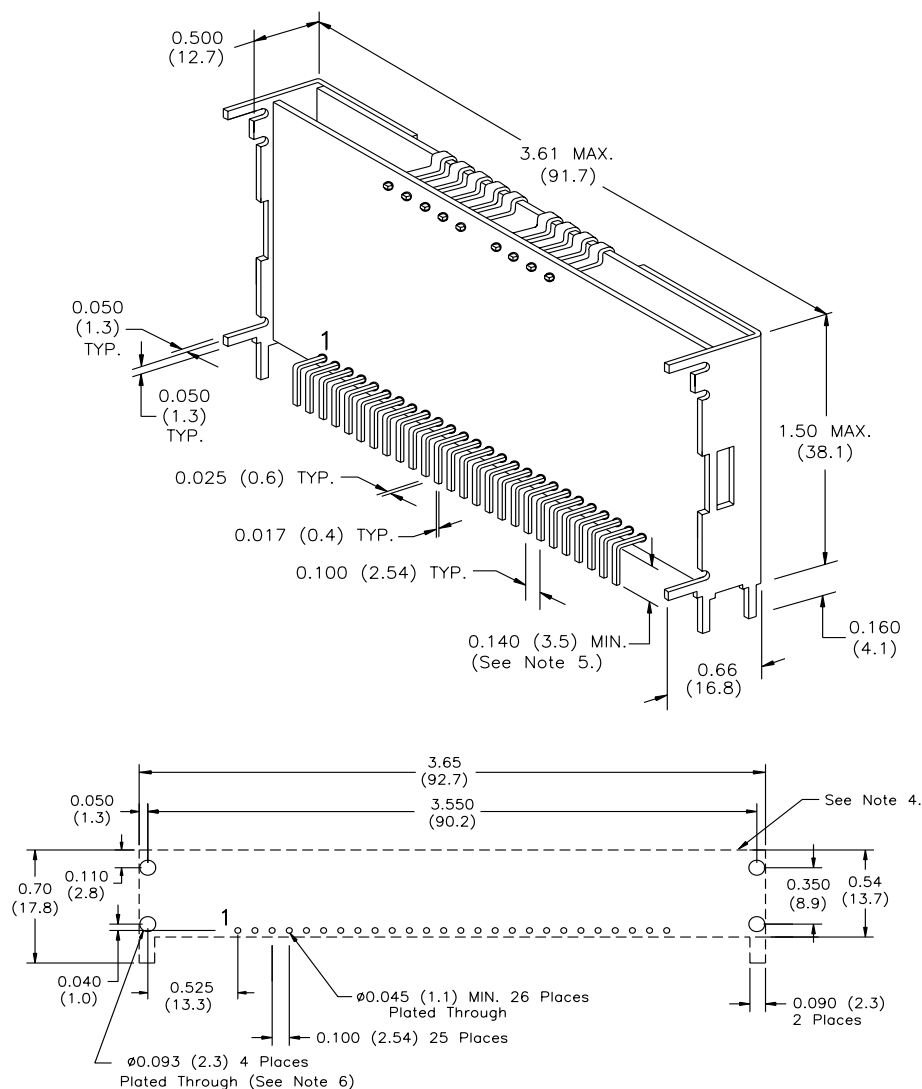**Safe Operating Area, V_o =15V** (See Note B)
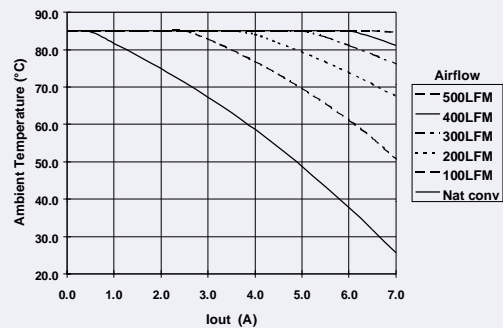
Note A: *All data listed in the above graphs has been developed from actual products tested at 25°C. This data is considered typical data for the DC/DC Converter.*
Note B: *SOA curves represent operating conditions at which the temperature of the metal case is at or below the maximum specified 100°C*

(Revised 6/30/2000)

PACKAGE INFORMATION AND DIMENSIONS

Vertical Through-Hole Mount (Suffix N)

0.500
(12.7)

3.61 MAX.
(91.7)

0.050
(1.3)
TYP.

0.050
(1.3)
TYP.

0.025 (0.6) TYP.

0.017 (0.4) TYP.

0.100 (2.54) TYP.

0.140 (3.5) MIN.
(See Note 5.)

1.50 MAX.
(38.1)

0.160
(4.1)

0.66
(16.8)

1

PC Layout

3.65
(92.7)

3.550
(90.2)

See Note 4.

0.050
(1.3)

0.110
(2.8)

0.70
(17.8)

0.350   0.54
(8.9)   (13.7)

0.040
(1.0)

0.525
(13.3)

ø0.045 (1.1) MIN. 26 Places
Plated Through

0.100 (2.54) 25 Places

0.090 (2.3)
2 Places

ø0.093 (2.3) 4 Places
Plated Through (See Note 6)

1

Notes: (Rev. E)
1: All dimensions are in inches (mm).
2: 2 place decimals are ±.030 (±0.8mm).
3: 3 place decimals are ±.010 (±0.3mm).
4: Recommended mechanical keep out area (dotted line).
5: Electrical pin length mounted on printed circuit board seating plane to pin end.
6: Option (Electrically connect heatsink pins to secondary ground.)

PACKAGE INFORMATION AND DIMENSIONS

Horizontal Through–Hole Mount (Suffix A)

PC Layout
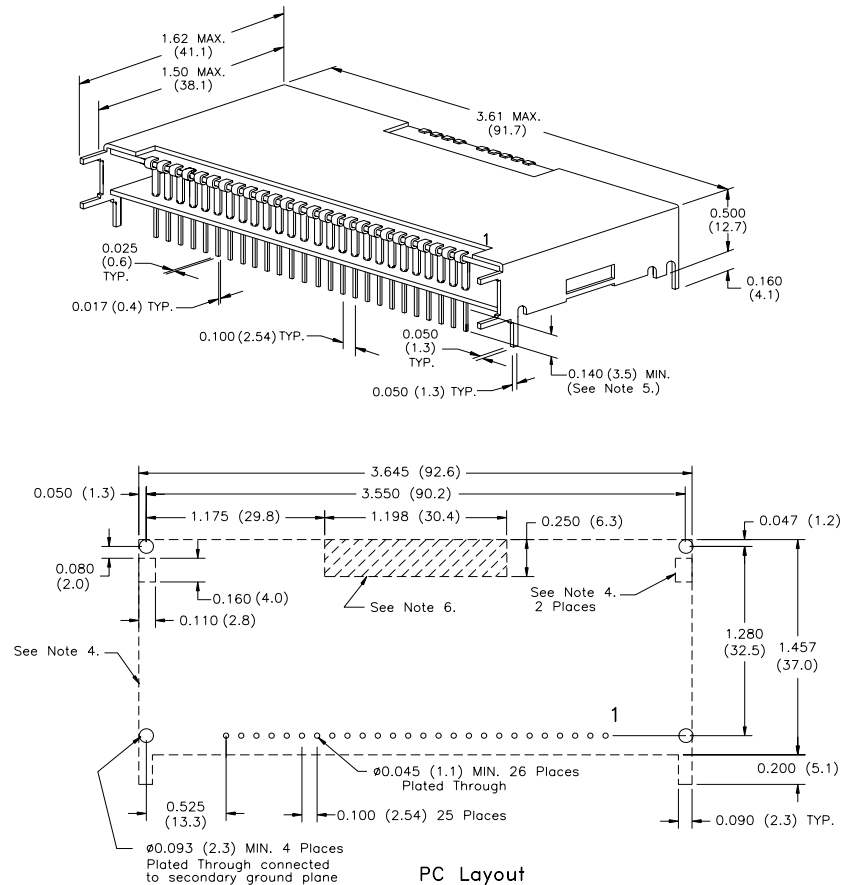
Notes: (Rev. G)

1: All dimensions are in inches (mm).
2: 2 place decimals are ±.030 (±0.8mm).
3: 3 place decimals are ±.010 (±0.3mm).
4: Recommended mechanical keep out area (dotted lines).
5: Electrical pin length mounted on printed circuit board seating plane to pin end.
6: No copper, power or signal traces in this area.

PACKAGE INFORMATION AND DIMENSIONS

Horizontal Surface Mount (Suffix C)

1.62 MAX. (41.1)
1.50 MAX. (38.1)
3.61 MAX. (91.7)
0.500 (12.7)
0.025 (0.6) TYP.
0.160 (4.1)
Detail "B"
0.100 (2.54) TYP.
0.050 (1.3) TYP.
0.050 (1.3) TYP.

3.645 (92.6)
0.050 (1.3)
3.550 (90.2)
1.175 (29.8)
1.198 (30.4)
0.250 (6.3)
Detail "A"
0.047 (1.2)
0.230 (5.8)
0.210 (5.3)
See Note 9.
1.280 (32.5)
1.457 (37.0)
See Note 7.
See Note 5.
0.050 (1.3)
0.050 (1.3) 26 Places
0.200 (5.1)
0.165 (4.2)
0.100 (2.54) 25 Places
0.090 (2.3) TYP.
0.525 (13.3)

PC Layout

0.050 (1.3)
0.100 (2.5)
Ø0.093 (2.3) MIN. Plated Through 4 Places
0.017 (0.43) TYP.
R0.010 (0.25)
0.090 (2.3)
0.140 (3.5)
0.070 (1.8)
0.004 (0.10)
0° to 6° TYP.
See Note 4.
See Note 6, 8
0.080 (2.03) TYP.
0.100 (2.5)
Pin Ref. Detail "B"

Detail "A"

Notes: (Rev. E)
1: All dimensions are in inches (mm).
2: 2 place decimals are ±.030 (±0.8mm).
3: 3 place decimals are ±.010 (±0.3mm).
4: Vias are recommended to improve copper adhesion.
5: Power pin connections should utilize two or more vias per input, ground and output pin.
6: Solder mask openings to copper island for solder joints to mechanical pins.
7: Recommended mechanical keep out area (dotted lines).
8: Electrically connected case to secondary ground plane.
9: No copper, power or signal traces in this are.

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