

Features

- 18V to 36V Input Voltage Range
- Programmable Output Voltage Range: 1.3V to 3.5V
- -40° to +100°C Operating Temp
- 1500 VDC Isolation
- 89% Efficiency
- Remote On/Off
- Differential Remote Sense
- 60A Output with PT4495
- Over-Current Protection (*Shutdown with Auto-Reset*)
- Over-Temperature Protection
- Over-Voltage Protection
- Space-Saving Package
- Solderable Copper Case
- Safety Approvals:
 - UL 60950
 - CSA 22.2 950
 - VDE EN60950 Pending

Description

The PT4452 Excalibur™ DC/DC converter module combines state-of-the-art power conversion technology with un-paralleled flexibility. Incorporating high efficiency and ultra-fast transient response, these modules provide up to 30A of output current over the programmable voltage range of 1.3V to 3.5V. This represents a full 100W output at 3.3V.

The modules include a number of inbuilt features to facilitate system integration. These include output over-current shutdown (with auto reset), over-temperature protection, and an inhibit on/off control. A differential remote sense is also provided to compensate for voltage drop between the converter and load.

For additional output current, one PT4452 may be operated with up to two PT4495 compatible booster modules. Each PT4495 adds an additional 30A of output current capability.

Ordering Information

PT4452□ = 1.3 to 3.5 Volts

PT4495□ = 30-A Booster

PT Series Suffix (PT1234x)

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

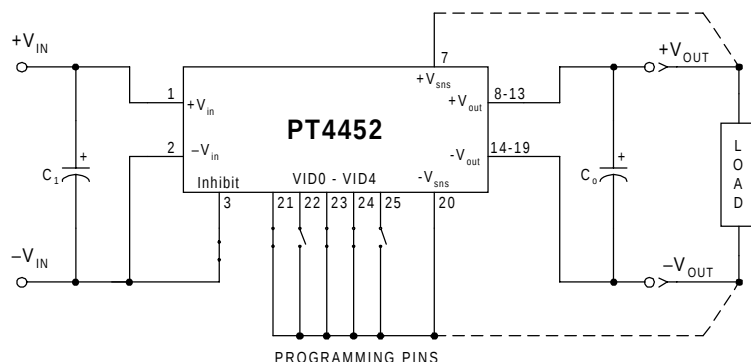
(Reference the applicable package code drawing for the dimensions and PC board layout)

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	V _f †	17	-V _{out}
5	V _a †	18	-V _{out}
6	No Connect	19	-V _{out}
7	(+)Remote Sense	20	(-)Remote 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	DRV †

† Pins 4, 5, & 26 are used for booster applications. For stand-alone operation, leave open circuit.

Standard Application



- C₀ = Optional 330µF electrolytic capacitor
- C₁ = Optional 33µF, 100V electrolytic capacitor
- C₂ = Optional 1µF, 100V ceramic capacitor
- Programming pins, VID0–VID4, are shown configured for V_o = 3.3V
- For normal operation, pin 3 (Inhibit) must be connected to -V_{in}.

Programming Information

VID3	VID2	VID1	VID0	VID4=1 V _{out}	VID4=0 V _{out}
1	1	1	1	2.0V	1.30V
1	1	1	0	2.1V	1.35V
1	1	0	1	2.2V	1.40V
1	1	0	0	2.3V	1.45V
1	0	1	1	2.4V	1.50V
1	0	1	0	2.5V	1.55V
1	0	0	1	2.6V	1.60V
1	0	0	0	2.7V	1.65V
0	1	1	1	2.8V	1.70V
0	1	1	0	2.9V	1.75V
0	1	0	1	3.0V	1.80V
0	1	0	0	3.1V	1.85V
0	0	1	1	3.2V	1.90V
0	0	1	0	3.3V	1.95V
0	0	0	1	3.4V	2.00V
0	0	0	0	3.5V	2.05V

Logic 0 = Connect to (–)Remote Sense, pin 20

Logic 1 = Open circuit (no pull-up resistors)

Specifications (Unless otherwise stated, T_a = 25°C, V_{in} = 24V, V_o = 3.3V, C_o = 0µF, and I_o = I_omax)

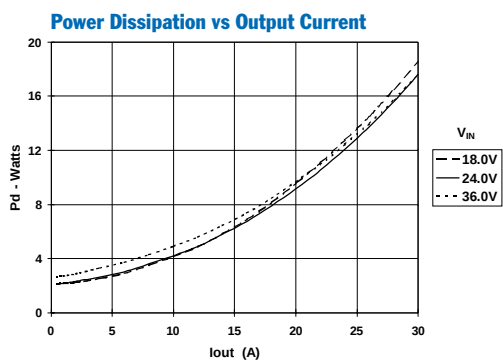
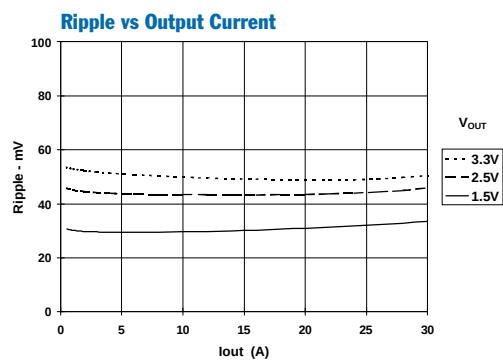
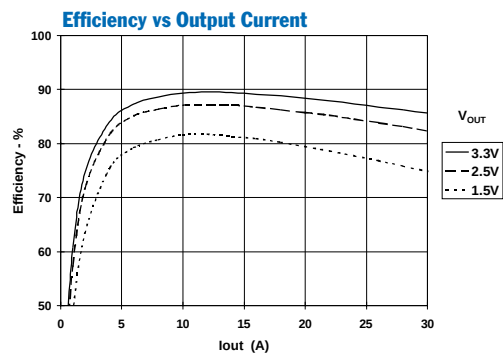
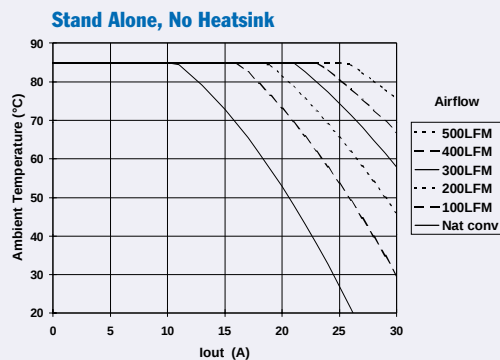
Characteristic	Symbol	Conditions	PT4452			Units
			Min	Typ	Max	
Output Current	I _o	Over V _{in} range	0	—	30	A
Input Voltage Range	V _{in}	Over I _o Range	18	24	36	VDC
Set Point Voltage Tolerance	V _o tol		—	±1	±1.5	%V _o
Temperature Variation	Reg _{temp}	–40° ≤ T _c ≤ +100°C, I _o = 0	—	±0.5	—	%V _o
Line Regulation	Reg _{line}	Over V _{in} range	—	±0.1	±1	%V _o
Load Regulation	Reg _{load}	Over I _o range	—	±0.2	±1	%V _o
Total Output Voltage Variation	ΔV _o tot	Includes set-point, line, load, –40° ≤ T _c ≤ +100°C	—	±2	±3	%V _o
Efficiency	η	I _o = 15A	V _o = 3.3V V _o = 2.5V V _o = 1.5V	89 87 81	—	%
V _o Ripple (pk-pk)	V _r	20MHz bandwidth	V _o > 2.0V V _o ≤ 2.0V	55 45	75 55	mV _{pp}
Transient Response	t _{tr}	0.1A/µs load step, 50% to 75% I _o max	—	N/A	—	µs
	ΔV _{tr}	V _o over/undershoot	—	1	—	%V _o
		1A/µs load step, 50% to 100% I _o max	—	75	—	µs
		V _o over/undershoot	—	±5	—	%V _o
Current Limit Threshold	I _{lim} thld	V _{in} = 18V, shutdown with auto-restart	—	35	—	A
Current Share Tolerance	I _{shr} tol	with PT4495 booster	—	±10	—	%
Over-Voltage Protection	OVP	Shutdown and latch off	—	125	—	%V _o
Switching Frequency	f _s	Over V _{in} range	270	300	350	kHz
Under-Voltage Lockout	UVLO		—	17	—	V
Inhibit (Pin 3)		Referenced to –V _{in} (pin 2)				
Input High Voltage	V _{IH}		2.5	—	Open (1)	V
Input Low Voltage	V _{IL}		–0.5	—	—	
Input Low Current	I _{IL}		—	–0.2	—	mA
Standby Input Current	I _{in} standby	pins 3 & 2 connected	—	4	10	mA
Internal Input Capacitance	C _{in}		—	3	—	µF
External Output Capacitance	C _{out}	Between +V _o and –V _o	0	—	10,000	µF
Isolation Voltage		Input-output/input-case	1500	—	—	V
Capacitance		Input to output	—	1100	—	pF
Resistance		Input to output	10	—	—	MΩ
Operating Temperature Range	T _c	Case temperature, over V _{in} range	–40	—	+115 (2)	°C
Over-Temperature Shutdown	OTP	Case temperature, auto reset	—	120	—	°C
Storage Temperature	T _s	—	–40	—	+125	°C
Reliability	MTBF	Per Bellcore TR-332 50% stress, T _a = 40°C, ground benign	1.4	—	—	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, Method 2007.2 20–2000Hz, pcb mounted	—	20 (3)	—	G's
Weight	—	—	—	90	—	grams
Flammability	—	Materials meet UL 94V-0	—	—	—	—

Notes: (1) The Inhibit (pin 3) has an internal pull-up, which if left open circuit allows the converter to operate when input power is applied. The open-circuit is limited to 6.5V. Refer to the application notes for interface considerations.

(2) See Safe Operating Area curves or contact the factory for the appropriate derating.

(3) The case pins on through-hole pin configuration (suffix A) must be soldered. For more information see the applicable package outline drawing.

PT4452 Performance Characteristics (See Note A)

Safe Operating Area, $V_{in} = 24V$ (See Note B)

Note A: Characteristic data has been developed from actual products tested at 25°C. This data is considered typical data for the Converter.

Note B: SOA curves represent the conditions at which internal components are at or below the manufacturer's maximum operating temperatures

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