PT4302

2 Channel 1×/1.5× Auto-Adjust Charge Pump White LED Driver

GENERAL DESCRIPTION

The PT4302 is a 2-channel 1×/1.5× auto-adjust charge pump white LED driver with LED fault detection. The auto-adjust charge pump achieves high efficiency for an Li-lion battery supply. LED fault detection feature allows the PT4302 to be self-adjusted to normal operation if an open or short occurs. The PT4302 needs few external components, which makes it an ideal choice for portable applications where a smaller board space is critical. The LED current is programmable from 3mA to 25mA in a 3mA step by applying digital codes at the EN/SET pin.

A built-in soft-start circuit prevents a high inrush current from being drawn from the supply source during power on and 1×/1.5× mode switching. The thermal shutdown and current limiter prevents the PT4302 from being damaged by short to ground or overload conditions. The ultra small shut-down current of less than 1μA significantly prolongs the battery life. The PT4302 is available in small MSOP-10 and QFN-10 packages.

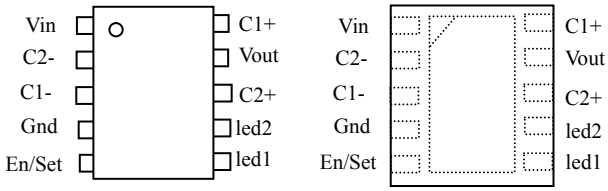
FEATURES

- 2.7V-5.5V input range
- 1x/1.5x auto-adjust charge pump
- LED fault detection
- Programmable 8 level LED currents from 3mA to 25mA
- < ±2% LED maximum current mismatch between channels
- Less than 1μA shut down current
- Built-in soft-start and mode soft-switching
- Miniature MSOP-10 and QFN-10 package

APPLICATIONS

- Cell phones
- PDAs
- Digital cameras
- Small LCD displays
- Programmable current sink

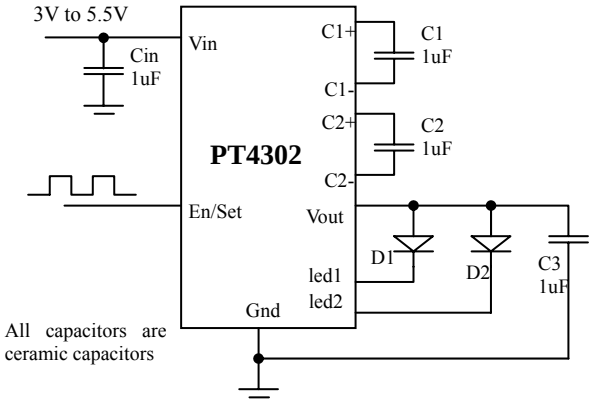
PACKAGES



MSOP-10 Top View

QFN-10 Top View

TYPICAL APPLICATION



PIN DESCRIPTION

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	Vin	Power supply	6	Led1	The current sink of channel 1 to drive LED
2	C2-	Negative terminal of fly capacitor 2	7	Led2	The current sink of channel 2 to drive LED
3	C1-	Negative terminal of fly capacitor 1	8	C2+	Positive terminal of fly capacitor 2
4	Gnd	ground	9	Vout	Output voltage source connecting to a 1μF cap
5	En/set	Chip enable and Led current programming pin	10	C1+	Positive terminal of fly capacitor 1

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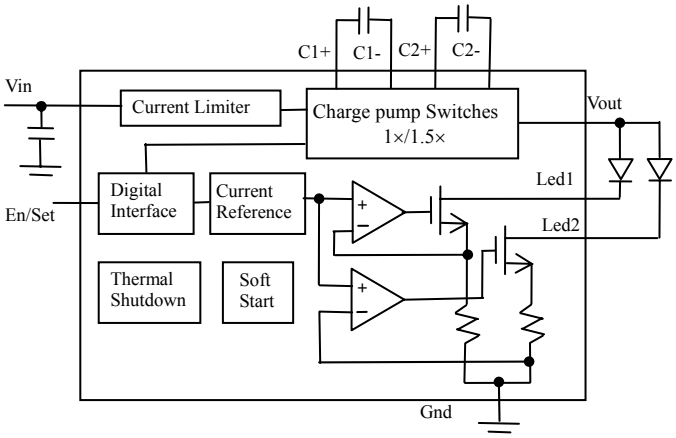
ABSOLUTE MAXIMUM RATINGS

PARAMETER		VALUE	UNIT
V_{IN} Range		-0.3~6.5V	V
V_{OUT} Range		-0.3~6.5V	V
$V_{En/Set}$ Range		V_{IN}+0.3~Gnd-0.3	V
Operation Junction Temp. range		-40~150	°C
Storage Temp.		-55~150	°C
MSOP Lead Soldering Temp.		260, 10 sec.	°C
Thermal resistance, Θ_{JA}	MSOP-10	190	W/°C
	QFN-10	40	

BRIEF BLOCK DIAGRAM



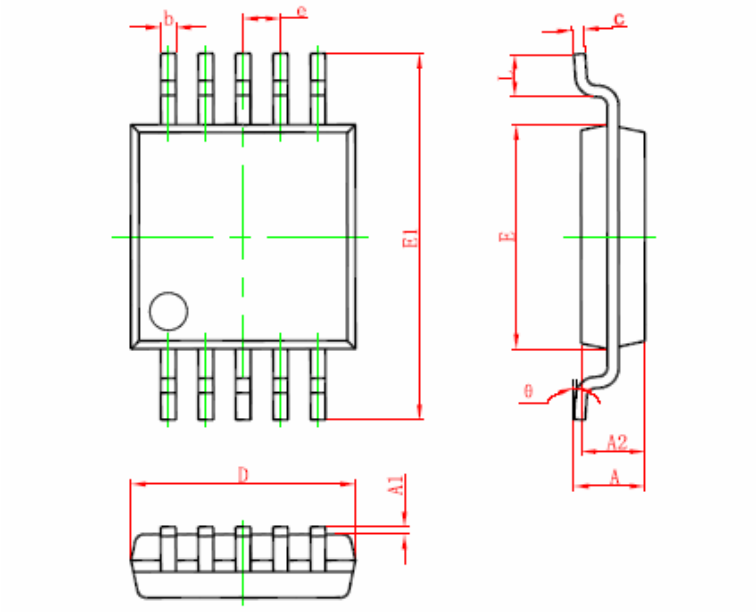
ELECTRICAL CHARACTERISTICS

V_{DD}=3.5V, , C1=C2=C3=C4=1μF, T_A=25℃, unless specified otherwise.

SYMBOL	ITEMS	CONDITIONS	Min.	Typ.	Max.	UNIT
V_{IN}	Input Voltage		2.7		5.5	V
I_{OFF}	Operating Current（Shutdown）	EN/SET=0		0.1	1	μA
Iq	Operating Current（Quiescent）	No load Current		1.5	3	mA
I_{OLP}	Over Load Protection	Short Vout to Gnd		300		mA
F_{CLK}	Charge Pump Switching Frequency		0.8	1.0	1.2	MHz
$T_{SS}^{(note.1)}$	Charge Pump Soft-start time			550		μs
V_{15-1}	The Threshold of 1.5X-> 1X	V_{LED1}=V_{LED2}=3.5V, I_{LED}=25mA		4		V
V_{1-15}	The Threshold of 1X-> 1.5X	V_{LED1}=V_{LED2}=3.5V, I_{LED}=25mA		3.8		V
I_{OUT}	Maximum LED output current	3.0<vin<5.5, V_{LED}=3.5V, en/set set the output to maximum current	22.5	25	27.5	mA
I_{Match}	Current match between D1 and D2	3.0<vin<5.5， en/set set the output to maximum current			2	%
V_{ovp}	Over output voltage protection	Vin=4, Open all led		5.5		V
V_{EN-L}	En/Set Maximum Low Level Threshold	Vin=5			1.4	V
V_{EN-H}	En/Set Minimum high level threshold	Vin=5	1.8			V
$I_{EN/SET}$	En/Set Input Current	V_{in}=5V, $V_{en/set}$=5	-1		1	uA
T_{setL}	En/Set low level width		0.3		75	us
T_{setH}	En/Set high level width			50		ns
T_{OFF}	En/Set shut down low level width				500	us
T_{INIT}	The period that En/Set stay at high level when system reset		100			us
T_{SD}	Thermal Shut Down Threshold	Temperature rise	150	160	170	°C
T_{HY}	Thermal Shut Down Hysteresis			10		°C

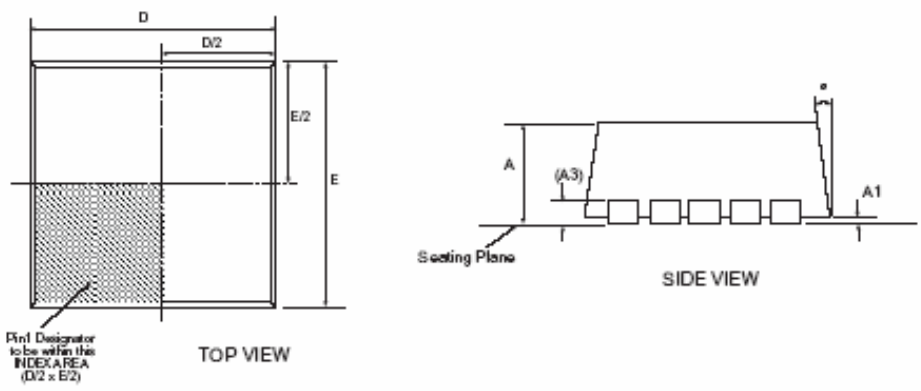
PACKAGE INFORMATION

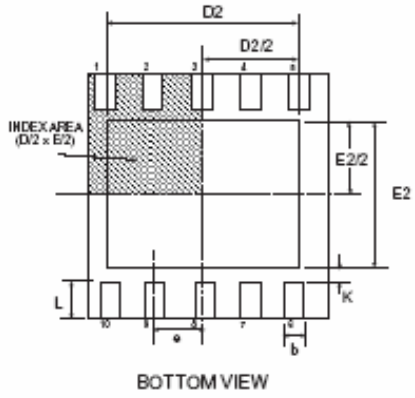
MSOP-10



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.50(BSC)		0.020(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

■ QFN-10





3x3 10 Pin DFN		JEDEC MO-229		VARIATION VEED-5		
SYMBOL	Dimensions in Millimeters: Controlling Dimension			Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.036	0.039
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3		0.20 REF			0.008 REF	
K	0.20	-	-	0.008	-	-
e	0°	-	14°	0°	-	14°
b	0.18	0.25	0.30	0.008	0.010	0.012
D		3.00 BSC			0.119 BSC	
D2	2.20	-	2.70	0.087	-	0.106
E		3.00 BSC			0.119 BSC	
E2	1.40	-	1.75	0.056	-	0.069
e		0.50 BSC			0.020 BSC	
L	0.30	0.40	0.50	0.012	0.016	0.020