1.5MHz, 1.5A Step-down Converter With Soft-Start

General Description

The LP6341 contains a independent 1.5MHz constant frequency, current mode, PWM step-down converters. The converter integrates a main switch and a synchronous rectifier for high efficiency without an external Schottky diode. The LP6341 is ideal for powering portable equipment that runs from a single cell Lithium-Ion (Li+) battery. The converter can supply 1500mA of load current from a 2.5V to 5.5V input voltage. The output voltage can be regulated as low as 0.5/0.6V. The LP6341 can also run at 100% duty cycle for low dropout applications.

The LP6341 is available in a 10-lead 3mm*3mm DFN-10 package and is rated over the -40°C to 85°C temperature range.

Order Information

LP6341□ - □ □ □ □ □

F: Pb-Free

Package Type
QV: TDFN-10

Output Voltage Type
12: 1.2V
18: 1.8V
33: 3.3V
A: Adjustable

Feedback Voltage
X: 0.6V
Default: 0.5V

Features

- Input Voltage Range: 2.5V to 5.5V
- Output Voltage Range: 0.6V to VIN
- 1500mA Load Current on Channel
- Up to 95% Efficiency
- 100% Duty Cycle in Dropout
- < 1 u A Quiescent Current
- 1.5MHz Switching Frequency
- Soft star Function
- Short Circuit Protection
- Current Mode Operation
- Thermal Fault Protection
- 3 m m × 3 m m TDFN-10 Package
- RoHS Compliant and 100% Lead (Pb)-Free

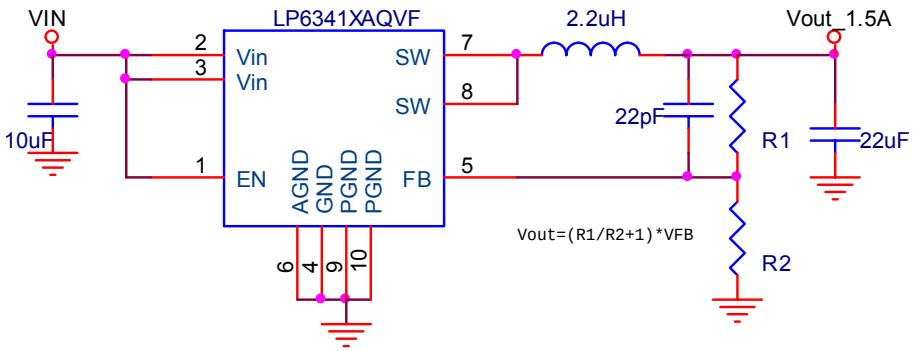
Applications

- Portable Media Players
- Cellular and Smart mobile phone
- PDA/DSC
- GPS Applications

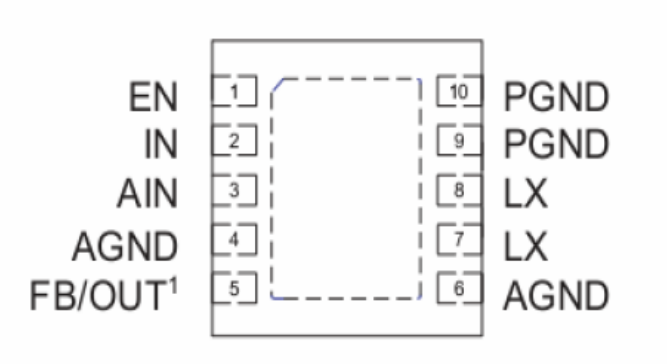
Marking Information

Please see website.

Typical Application Circuit



Functional Pin Description

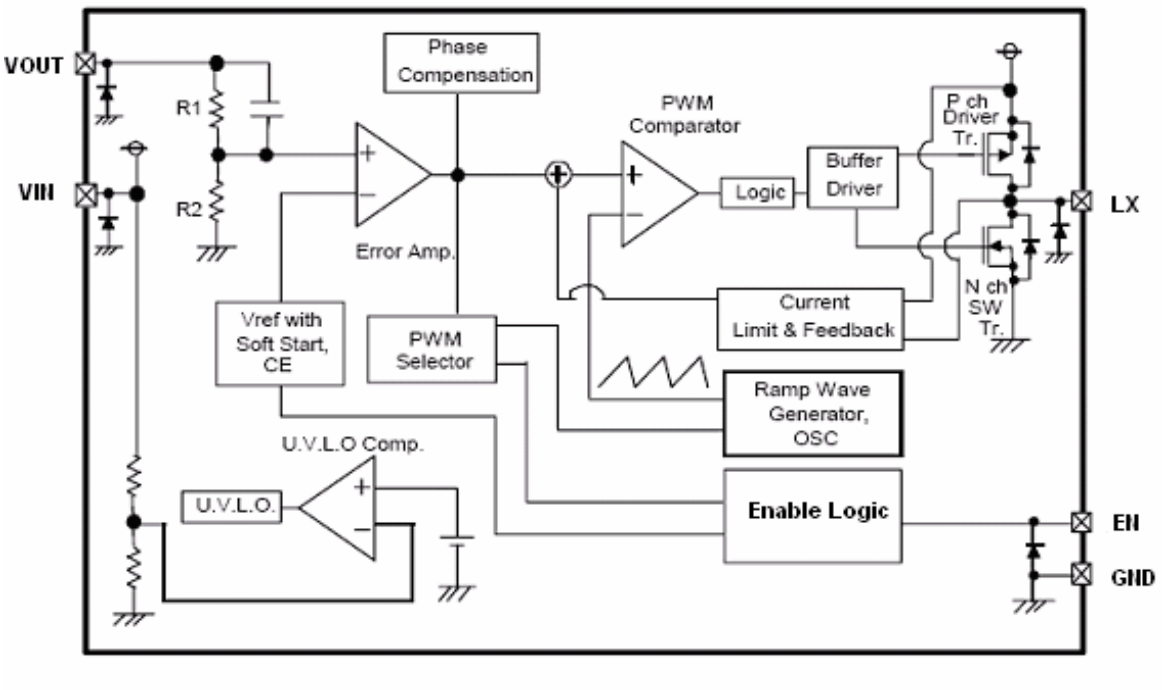


DFN-10(Top View)

Pin Description

Pin NO	PIN	DESCRIPTION
1	EN	Enable Control Input. Drive EN1 above 1.5V to turn on the Channel. Drive EN below 0.3V to turn it off (shutdown current < 0.1μA).
2, 3	Vin	Supply Input.
4,9,10	GND/PGND	Ground.
5	FB	Feedback Input. Connect FB to the center point of the external resistor divider. Normal voltage for this pin is 0.6V.
6	AGND	Analog Ground Pin.
7, 8	SW	Switch Mode Connection to Inductor. This pin connects to the drains of the internal main and synchronous power MOSFET switches.

Function Block Diagram



Absolute Maximum Ratings

- ✧ Input Voltage to GND ---------- 6V
- ✧ SW to GND (V_{SW}) ---------- 0.3V to V_{IN} +0.3V
- ✧ FB to GND (V_{FB}) ---------- 0.3V to V_{IN} +0.3V
- ✧ EN EN_BAT to GND (V_{EN}) ----------0.3V to 6V
- ✧ Operating Junction Temperature Range (T_J) ----------40℃ to 150℃
- ✧ Maximum Soldering Temperature (at leads, 1 0sec) ----------260℃

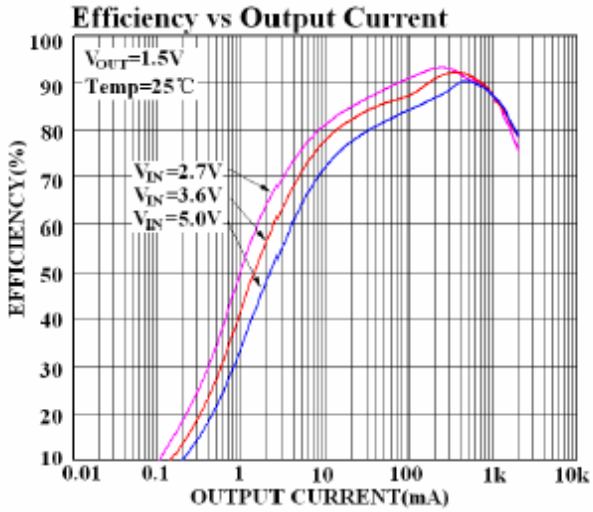
Electrical Characteristics

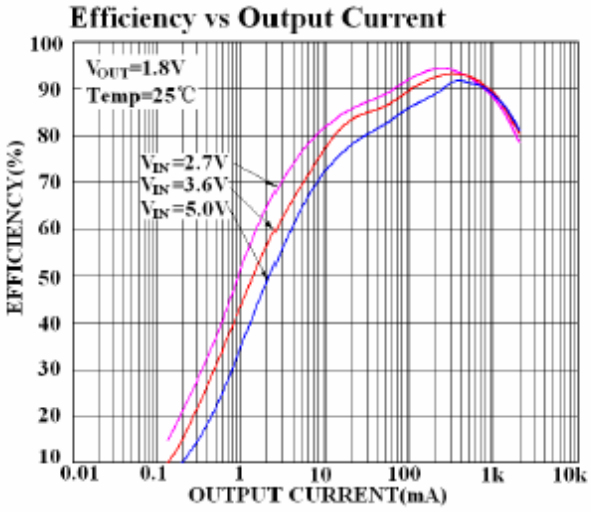
(V_{IN} =V_{EN},Typical values are T_A=25℃)

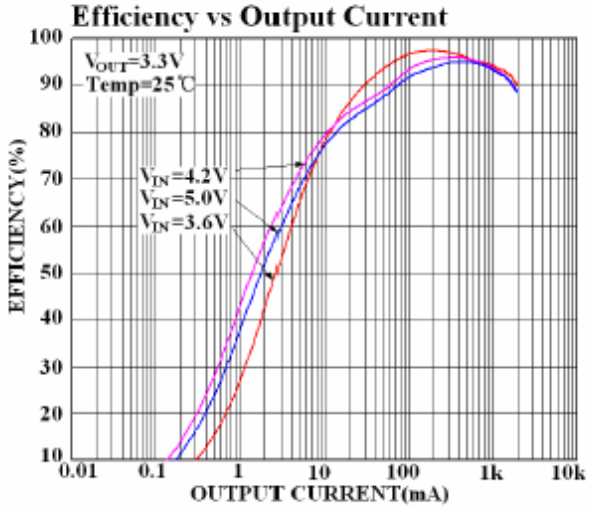
Symbol	Parameter	Conditions		LP6341		Unit
			Min.	Typ.	Max.	
Step-Down Converter						
V_{IN}	Input Voltage		2.5		5.5	V
△V_{OUT}	Output Voltage Line Regulation	I_{LOAD} = 0 V_{INB} = 2.5V to 5.5V		0.25	0.4	%/V
△V_{FB}	Reference Voltage Line Regulation	V_{INB} = 2.5V to 5.5V		0.25	0.4	%/V
V_{OUT}	Output Voltage Range		0.6		V_{INB}	V
I_Q	Quiescent Current	V_{FB1}=V_{FB2}=0V,$V_{IN1/IN2}$=4.2V		270	350	μA
I_{SHDN}	Shutdown Current	ENB = GND			1	μA
I_{LIM}	P-Channel Current Limit		2.3	2.5	3	A
$R_{DS(ON)H}$	High-Side Switch On Resistance			130	210	m Ω
$R_{DS(ON)L}$	Low-Side Switch On Resistance			120	200	m Ω
I_{LXLEAK}	LX Leakage Current	$V_{EN1/EN2}$=0V, $V_{SW1/SW2}$=0 or 5V, $V_{IN1/IN2}$=5V			1	μA
$\Delta V_{Line-reg}/\Delta V_{IN}$	Line Regulation	V_{INB} = 2.8V to 5.5V		0.2	0.4	%/V
V_{FB}	Feedback Threshold Voltage Accuracy	V_{INB} = 3.6V，LP6341AQVF	0.485	0.5	0.515	V
		V_{INB} = 3.6V，LP6341XAQVF	0.588	0.6	0.612	V
I_{FB}	FB Leakage Current	V_{OUTB} = 1 .0V		30		nA
F_{OSC}	Oscillator Frequency		1.2	1.5	1.8	MHz
T_S	Startup Time	From Enable to Output Regulation		120		μs
T_{SD}	Over-Temperature Shutdown Threshold			150		℃
T_{HYS}	Over-Temperature Shutdown Hysteresis			20		℃
$V_{EN(L)}$	Enable Threshold Low				0.4	V
$V_{EN(H)}$	Enable Threshold High		0.3	1.0	1.5	V
I_{EN}	Input Low Current	V_{INB} = V_{ENB} = 5.5V	-1		1	μA

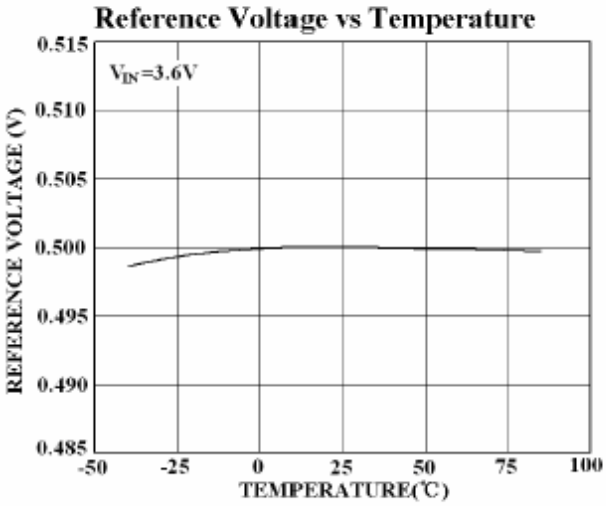
Note: Output Voltage: Vout = VFB x (1+R2/R1) Volts;

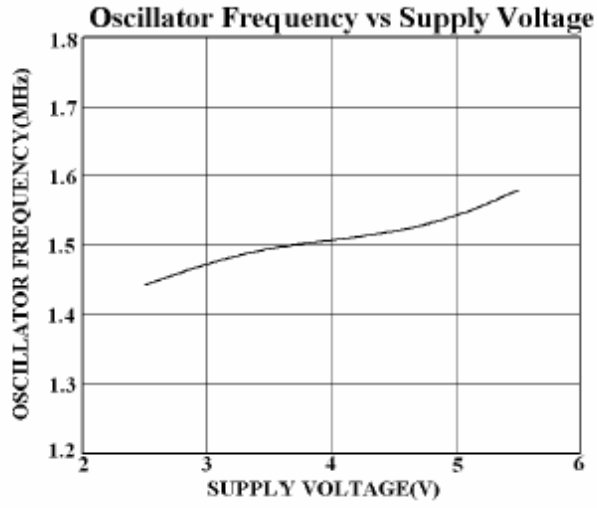
Typical Operating Characteristics

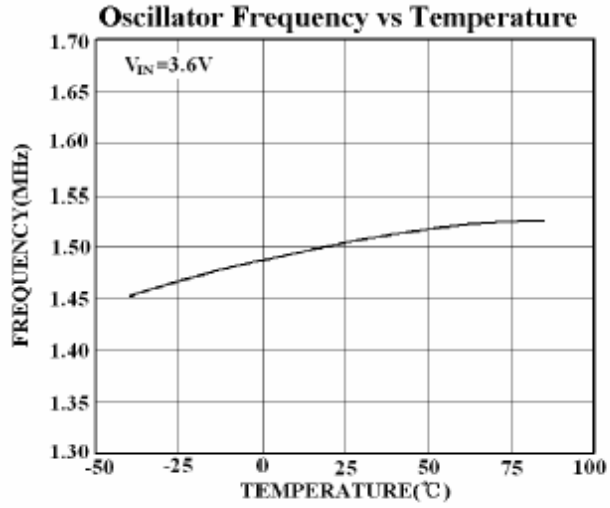


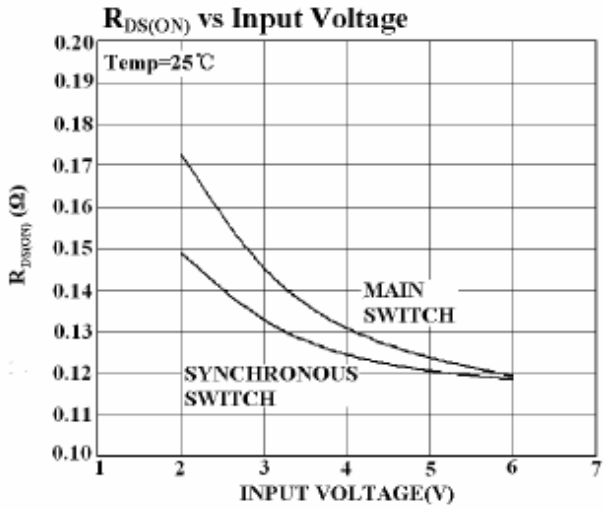


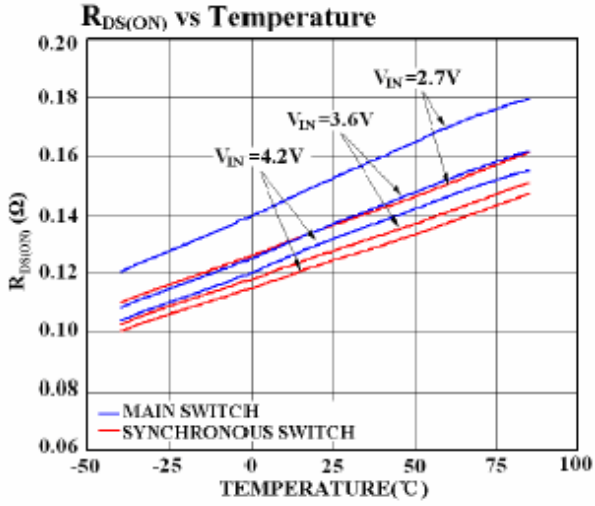


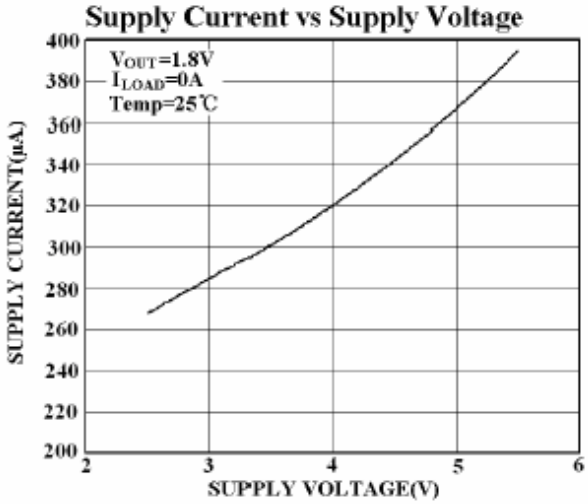


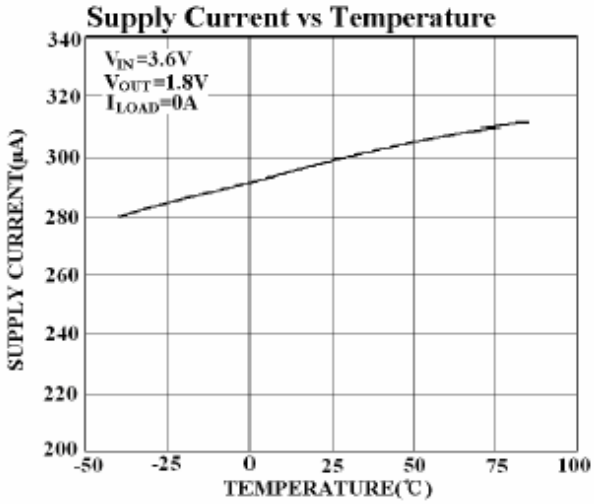


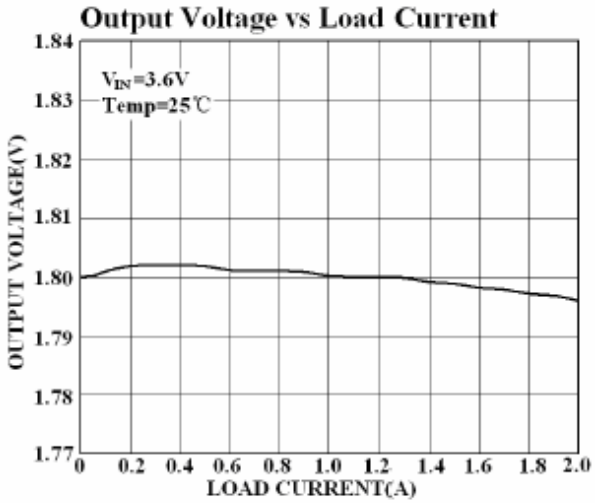



RDS(ON) vs Input Voltage
Temp=25℃
MAIN SWITCH
SYNCHRONOUS SWITCH
RDS(ON) (Ω)
INPUT VOLTAGE(V)

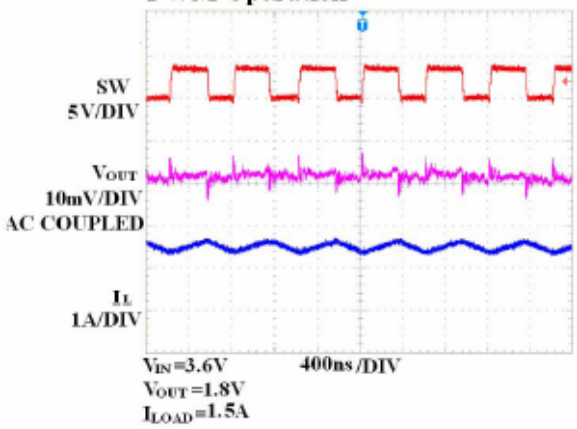

RDS(ON) vs Temperature
VIN=2.7V
VIN=3.6V
VIN=4.2V
MAIN SWITCH
SYNCHRONOUS SWITCH
RDS(ON) (Ω)
TEMPERATURE(℃)


Supply Current vs Supply Voltage
VOUT=1.8V
ILOAD=0A
Temp=25℃
SUPPLY CURRENT(μA)
SUPPLY VOLTAGE(V)

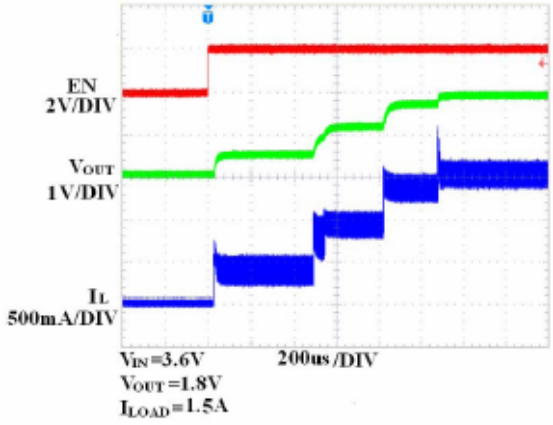

Supply Current vs Temperature
VIN=3.6V
VOUT=1.8V
ILOAD=0A
SUPPLY CURRENT(μA)
TEMPERATURE(℃)


Output Voltage vs Load Current
VIN=3.6V
Temp=25℃
OUTPUT VOLTAGE(V)
LOAD CURRENT(A)

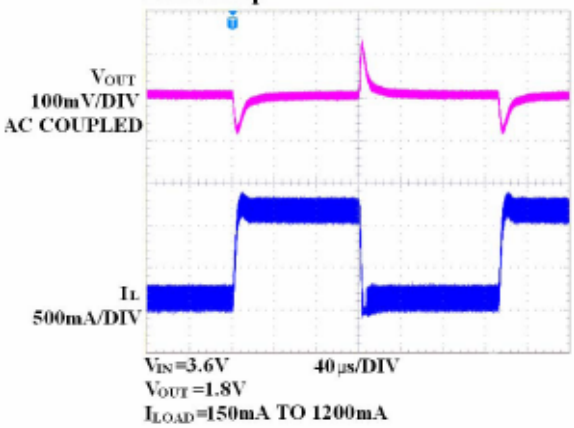
PWM Operation



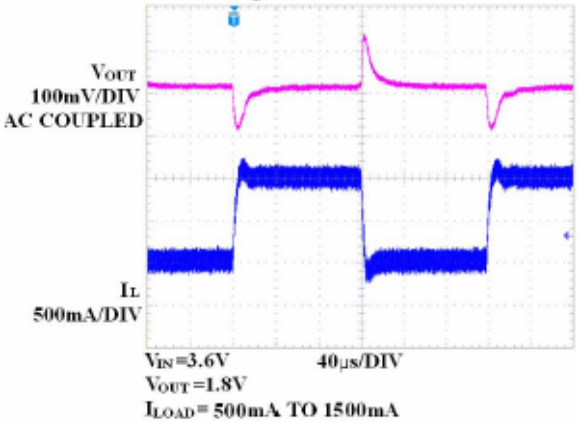
Soft Start



Load Step

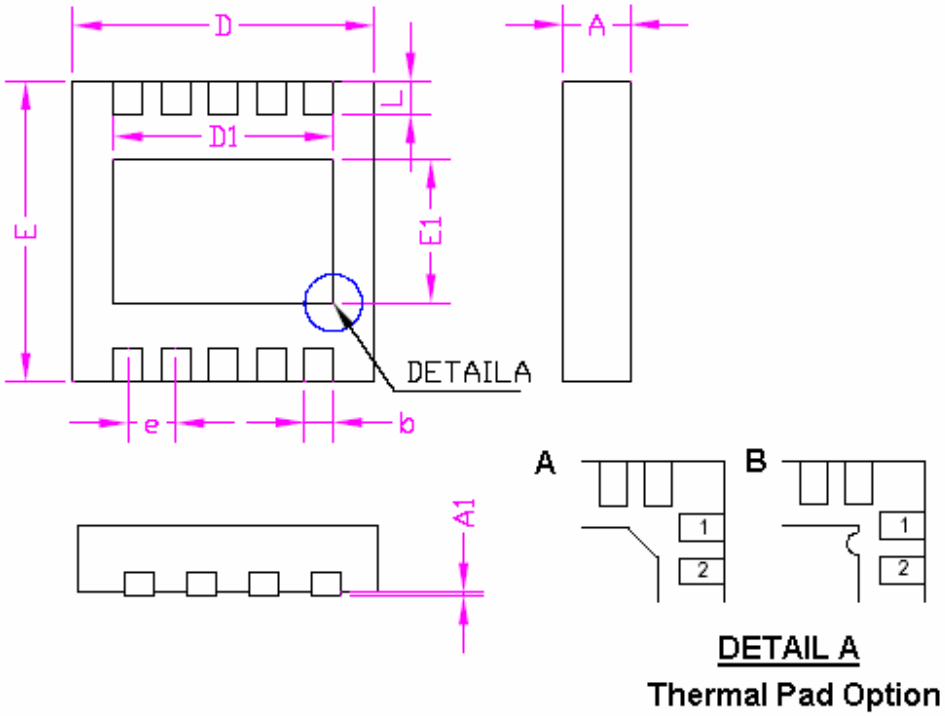


Load Step



Packaging Information

TDFN-10



DETAIL A

Thermal Pad Option

SYMBOLS	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	0.80	0.028	0.031
A1	0.00	0.05	0.000	0.002
D1	2.50		0.098	
D	2.90	3.10	0.114	0.122
E1	1.70		0.067	
E	2.90	3.10	0.114	0.122
L	0.30	0.50	0.012	0.020
b	0.18	0.30	0.007	0.012
e	0.50		0.020	
D1	2.40		0.094	