

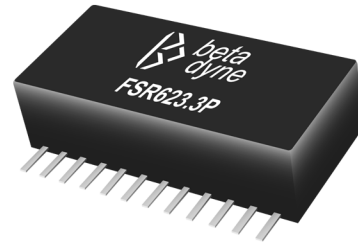


FSR6

30W MAX. WIDE INPUT / WIDE OUTPUT
STEP-DOWN SWITCHING REGULATORS

Features

- 2W to 30W output power range
- Wide input voltage range ($9V_{IN}$ to $28V_{IN}$)
- Wide output voltage range ($1.8V_{OUT}$ to $15V_{OUT}$)
- Adjustable output voltage
- Efficiency up to 97%
- Over load protection (125% full load typical)
- Continuous short circuit protection (Low short current: $I_{IN} < 50mA$)
- ON/OFF Control (Ground Off)
- Non-isolation



Electrical Specifications: Regulated INPUT SPECIFICATIONS

Measured at 25°C with the condition of V_{IN} = Nominal and Full Load. Specifications subject to change without notice.

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range	See Model Selection Guide				
Input Filter	Capacitor (See Figures 1A & 1B)				
Shutdown Current	ON/OFF Pin pull low		100		μA
Quiescent Current	$I_O = 0A$, Minimum V_{IN} to maximum V_{IN}		6	10	mA
ON/OFF Control, Converter ON ¹	Open or high level	2.0		10	Vdc
ON/OFF Control, Converter OFF ¹	Low level			0.8	Vdc

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage	See Model Selection Guide				
Output Current	See Model Selection Guide				
Output Voltage Accuracy			± 1	± 2	%
Ripple & Noise, FSR61			40	100	mV _{pp}
Ripple & Noise, FSR62			40	120	mV _{pp}
Line Regulation, FSR61	Minimum V_{IN} to maximum V_{IN} , FL			0.5	%
Line Regulation, FSR62	Minimum V_{IN} to maximum V_{IN} , FL			0.5	%
Load Regulation, FSR61	10% FL to FL			0.5	%
Load Regulation, FSR62	10% FL to FL			1.0	%
Transient Response	50% load change		100	200	μS
	V_O - Over/Undershoot		5		%
Short Circuit Protection	V_{IN} 12V	20		100	mA

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency @ FL	See Model Selection Guide				
Switching Frequency		200	250	300	kHz

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature Range	Ambient	-40		+85	°C
Operating Case Temperature			+100	+110	°C
Storage Temperature Range		-40		+125	°C

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	1.27×0.59×0.36 in. (32.20×15.00×9.10mm)				
Weight	0.32 oz. (9.0g)				

¹ ON/OFF pin driven by open collector of bipolar transistor or open drain of MOSFET or TTL (logic gate).

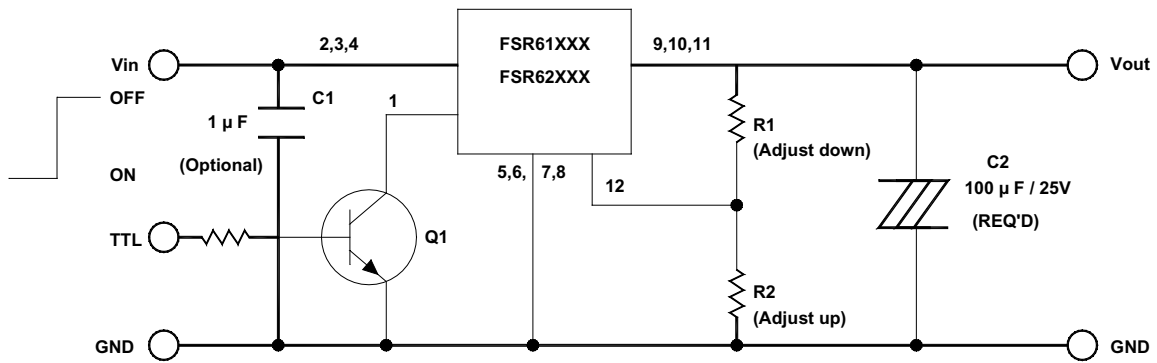
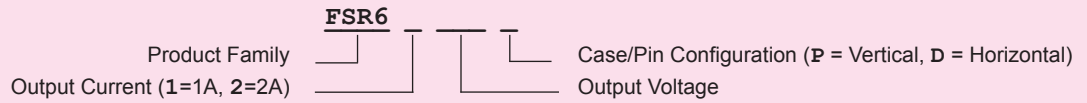
² Measured with a 100 μF electrolytic or tantalum output capacitor (placed as close as possible to output pins) for proper operation in all applications.

MODEL SELECTION GUIDE

(NOTE: If the adjust function is used: $V_{IN} - V_{OUT} \geq 1.5V$. Contact factory for custom input & output voltages.)

MODEL NUMBER	MAX OUTPUT POWER (W)	OUTPUT VOLTAGE (Vdc)	V ADJUST RANGE (Vdc)	OUTPUT CURRENT (A)	INPUT VOLTAGE		EFFICIENCY (%)	
					MIN	MAX	MIN V	MAX V
FSR613.3P/D	6	3.3	1.8-6.0	1	9	28	88	81
FSR615.0P/D	9	5.0	1.8-9.0	1	9	28	92	86
FSR619.0P/D	15	9.0	3.3-15.0	1	11	28	96	89
FSR6112P/D	15	12.0	3.3-15.0	1	14	28	97	94
FSR623.3P/D	12	3.3	1.8-6.0	2	9	28	86	82
FSR625.0P/D	18	5.0	1.8-9.0	2	9	28	90	87
FSR629.0P/D	30	9.0	3.3-15.0	2	11	28	95	92
FSR6212P/D	30	12.0	3.3-15.0	2	14	28	96	94

ORDERING GUIDE



Q1: Transistor or MOSFET (V_{CE} or $V_{DS} > 25Vdc$)

FIGURE 1. Standard application circuit

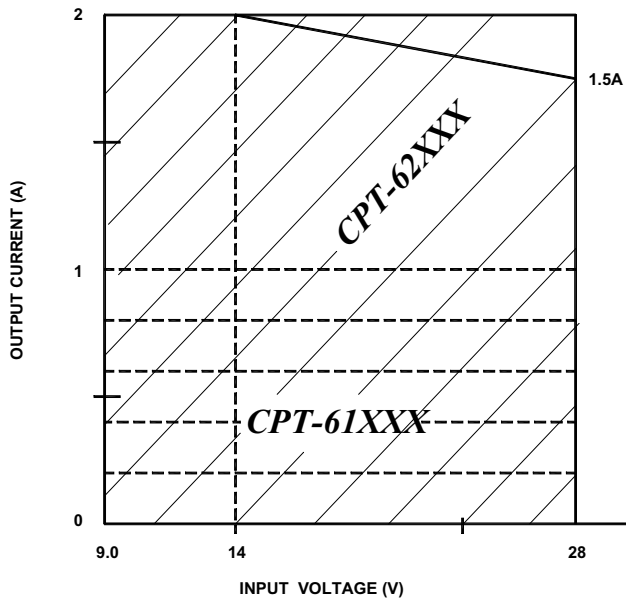


FIGURE 2. Output Current vs. Input Voltage

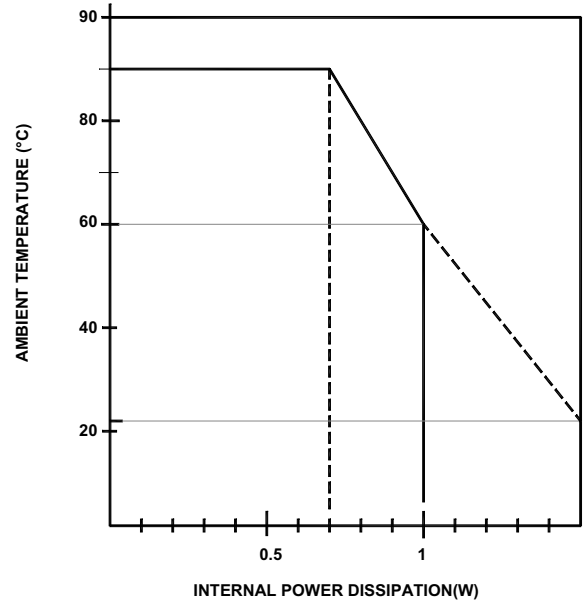


FIGURE 2. Derating curve

How to Calculate Maximum Output Current

The internal Power Dissipation (P_D) can be calculated by:

$$P_D = V_o * I_o * (1-\eta)$$

$$I_o = P_D / V_o * (1-\eta)$$

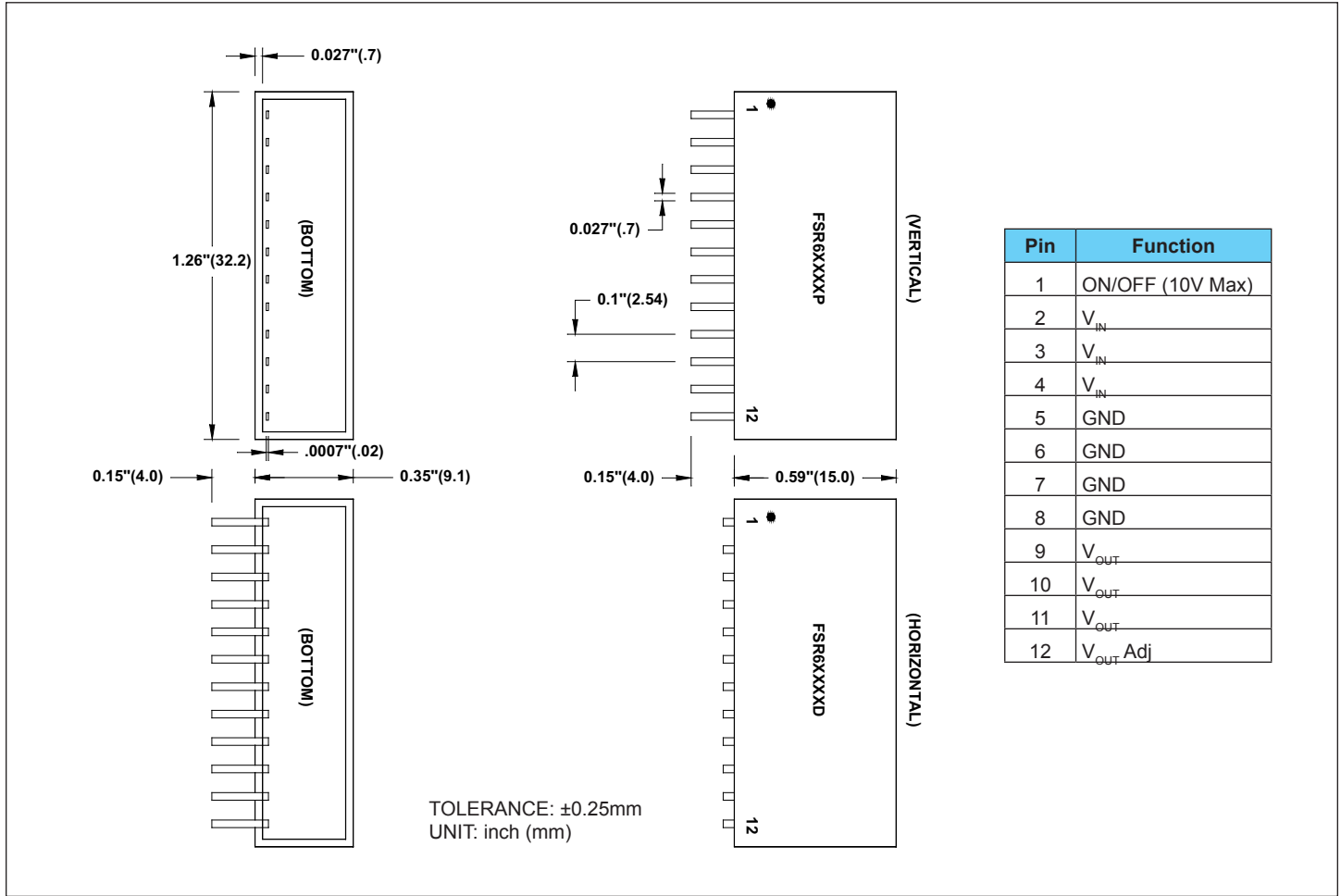
Where P_D = Internal power dissipation
 I_o = Output current
 V_o = Output voltage
 η = Efficiency

Examples:

(a) FSR6212P at $V_{IN}=28Vdc$, $V_o=12Vdc$, $\eta=94\%$ (See Table 1)
 $I_o = 1(W) / 12(V) * (1-0.94) = 1.388(A) \approx 1.5(A)$

(b) FSR6212P at $V_{IN}=14Vdc$, $V_o=12Vdc$, $\eta=96\%$ (See Table 1)
 $I_o = 1(W) / 12(V) * (1-0.96) = 2.08(A)$ (spec = 2A Max)

Mechanical Specifications



Pin	Function
1	ON/OFF (10V Max)
2	V_{IN}
3	V_{IN}
4	V_{IN}
5	GND
6	GND
7	GND
8	GND
9	V_{OUT}
10	V_{OUT}
11	V_{OUT}
12	V_{OUT_Adj}

TABLE 1. Adjust output voltage vs. R1/R2 values

1A	FSR613.3P/D		FSR615.0P/D		FSR619.0P/D		FSR6112P/D	
2A	FSR623.3P/D		FSR625.0P/D		FSR629.0P/D		FSR6212P/D	
V_{OUT} (Nom)	3.3Vdc		5.0Vdc		9.0Vdc		12Vdc	
V_{OUT} (Adj)	R1	R2	R1	R2	R1	R2	R1	R2
1.8V	3.1K Ω	-	820 Ω	-	-	-	-	-
2.0V	5.1K Ω	-	1.5K Ω	-	-	-	-	-
2.5V	13K Ω	-	3.6K Ω	-	-	-	-	-
3.0V	51K Ω	-	7.0K Ω	-	-	-	-	-
3.3V	-	-	9.7K Ω	-	0 Ω	-	0 Ω	-
3.6V	-	18K Ω	14K Ω	-	1.5K Ω	-	560 Ω	-
3.9V	-	9.1K Ω	20K Ω	-	3.3K Ω	-	1.2K Ω	-
4.5V	-	3.9K Ω	60K Ω	-	7.5K Ω	-	2.1K Ω	-
5.0V	-	2.4K Ω	-	-	11K Ω	-	4.0K Ω	-
5.1V	-	2.2K Ω	-	60K Ω	12K Ω	-	4.3K Ω	-
5.5V	-	1.6K Ω	-	15K Ω	17K Ω	-	5.6K Ω	-
6.0V	-	1.1K Ω	-	7.2K Ω	24K Ω	-	7.5K Ω	-
7.0V	-	-	-	2.8K Ω	51K Ω	-	12K Ω	-
8.0V	-	-	-	1.5K Ω	130K Ω	-	19K Ω	-
9.0V	-	-	-	880 Ω	-	-	31K Ω	-
10V	-	-	-	450 Ω	-	36K Ω	55K Ω	-
11V	-	-	-	180 Ω	-	15K Ω	125K Ω	-
12V	-	-	-	-	-	8.2K Ω	-	-
13V	-	-	-	-	-	4.7K Ω	-	11K Ω
14V	-	-	-	-	-	2.7K Ω	-	4.0K Ω
15V	-	-	-	-	-	1.3K Ω	-	1.6K Ω