

2.1A 100KHz 100V Buck DC to DC Converter

XL7056

Features

- Operating Voltage: 8V~80V
- Maximum Duty Cycle up to 85%
- Minimum Drop Out 2.0V
- Adjust VOUT from 1.25V to 20V
- Max. IOUT=2.1A at VOUT=5V
- Max. IOUT=1.2A at VOUT=15V
- Fixed 100KHz Switching Frequency
- Max. Output power less than 20W
- Internal Optimize HV Power MOSFET
- High efficiency up to 93%
- Excellent line and load regulation
- Built in current limit function
- Built in output short Protection Function
- TO263-7L package

General Description

The XL7056 is a 100KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 2.1A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 85%.

Applications

- Ebike Controller Power Supply
- Telecom / Networking Equipment



Figure1. Package Type of XL7056

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Pin Configurations

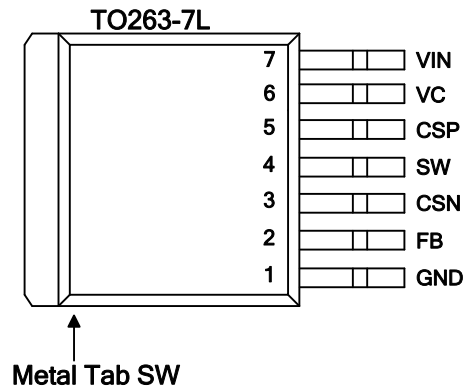


Figure2. Pin Configuration of XL7056 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL7056.
2	FB	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.25V.
3	CSN	Current Sense Negative Terminal Pin.
4	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. The Metal is SW.
5	CSP	Current Sense Positive Terminal Pin.
6	VC	Internal Voltage Regulator Bypass Capacitor Pin (VC). The VC pin connect a 1uf capacitor to VIN.
7	VIN	Supply Voltage Input Pin. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.

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Function Block

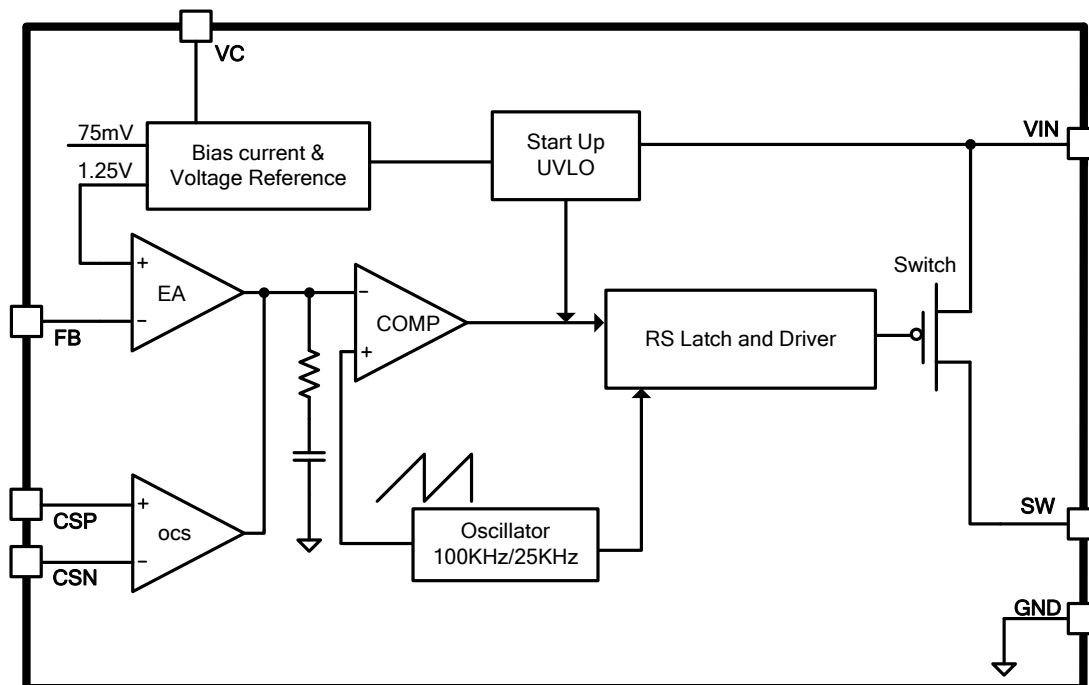
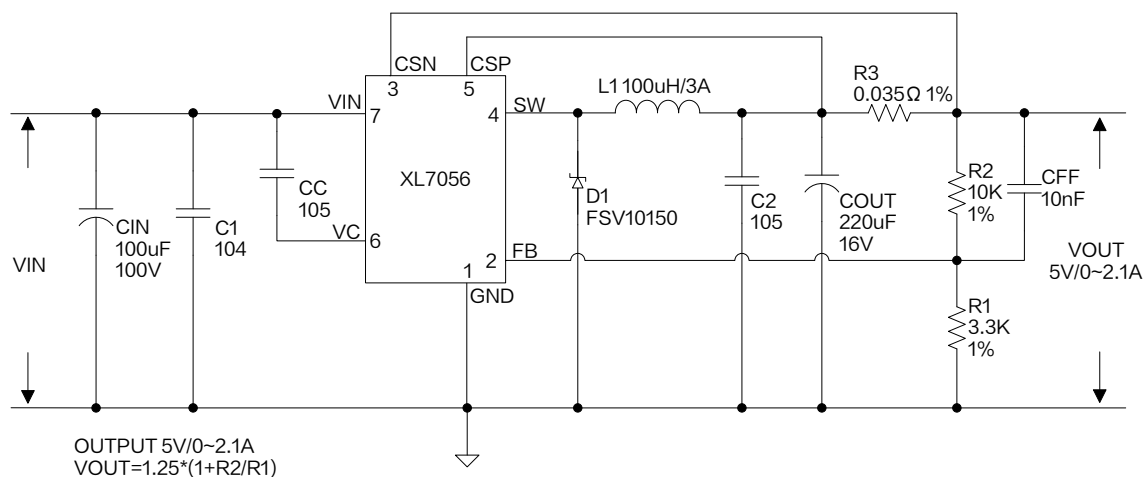


Figure3. Function Block Diagram of XL7056

Typical Application Circuit



R3 for limit maximum output current, R3 choose 0.035ohm in $V_{OUT} \leq 5V$ application; R3 choose 0.055ohm in $V_{OUT} > 5V$ application.

Figure4. XL7056 Typical Application Circuit

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Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL7056E1	XL7056E1	TO263-7L	RoHS & HF	800 Units on Tape & Reel

Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
VIN Pin Voltage	V_{IN}	-0.3 to 100	V
FB Pin Voltage	V_{FB}	-0.3 to 5	V
SW Pin Voltage	V_{SW}	-0.3 to VIN	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (TO263-7L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	30	°C/W
Maximum Junction Temperature	T_J	-40 to 150	°C
Operating Junction Temperature	T_J	-40 to 125	°C
Storage Temperature	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	°C
ESD (HBM)		>2000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

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XL7056 Electrical Characteristics

 $T_a = 25^{\circ}\text{C}$; unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure4						
VFB	FB Voltage	Vin =20V to 80V, Vout=15V Iload=0.5A	1.225	1.25	1.275	V
η	Efficiency	Vin=24V, Vout=15V Iout=1.2A	–	95	–	%
η	Efficiency	Vin=36V, Vout=15V Iout=1.2A	–	94	–	%
η	Efficiency	Vin=48V, Vout=15V Iout=1.2A	–	93	–	%
η	Efficiency	Vin=60V, Vout=15V Iout=1.2A	–	92	–	%
η	Efficiency	Vin=72V, Vout=15V Iout=1.2A	–	91	–	%

Electrical Characteristics (DC Parameters)

Vin = 48V, GND=0V, Vin & GND parallel connect a 47uf/100V capacitor; Iout=0.2A, $T_a = 25^{\circ}\text{C}$; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin		8		80	V
VIN UVLO	Vin_uvlo			6		V
Quiescent Supply Current	Iq	V _{FB} =2V		2.1	5	mA
Oscillator Frequency	Fosc		75	100	135	KHz
Switch Current Limit	IL	V _{FB} =0V, R3=0.035Ω		2.3		A
Output Power PMOS	Rdson	V _{IN} =48V, I _{SW} =1.0A			260	mohm

Typical Performance Characteristics

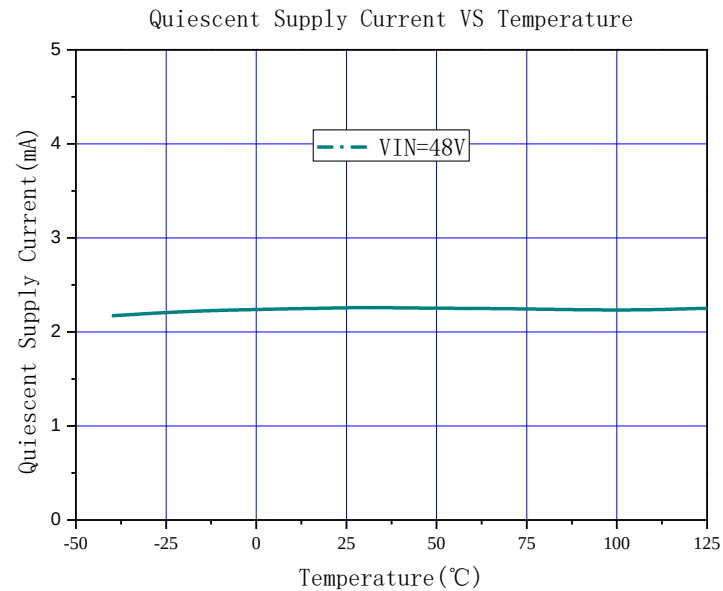


Figure5. Quiescent Current Curve

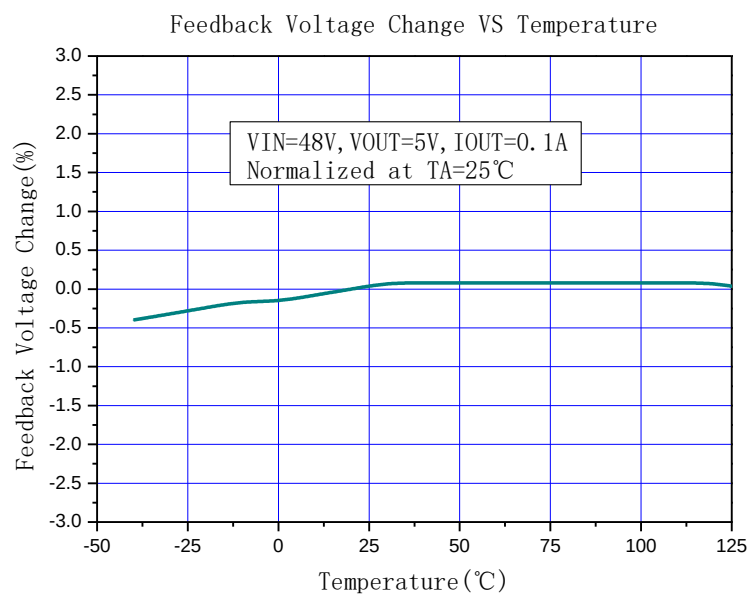


Figure6. Feedback Voltage Curve

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Typical System Application (VOUT=15V, IOUT=0~1.2A)

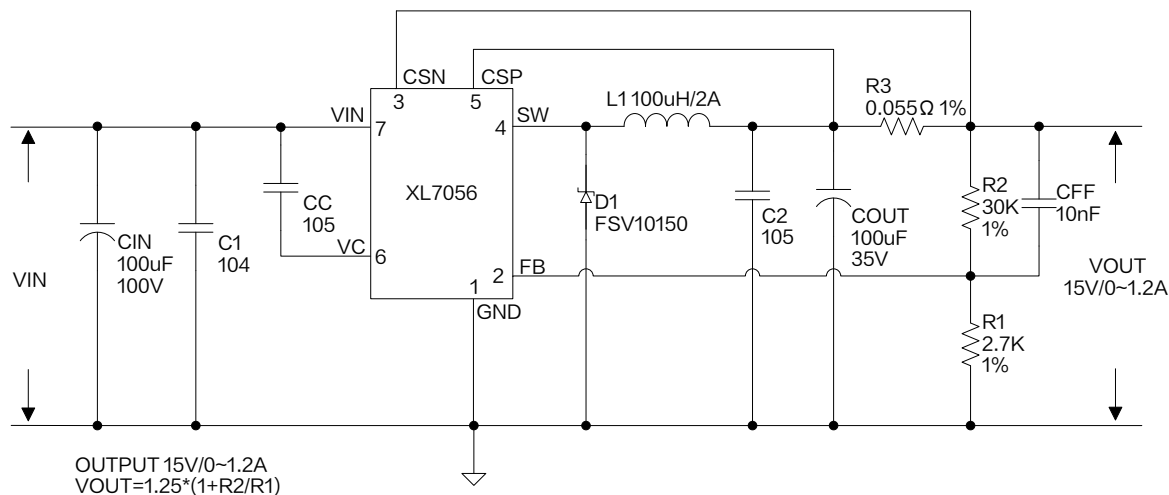


Figure7. XL7056 System Application (VOUT=15V, IOU=0~1.2A)

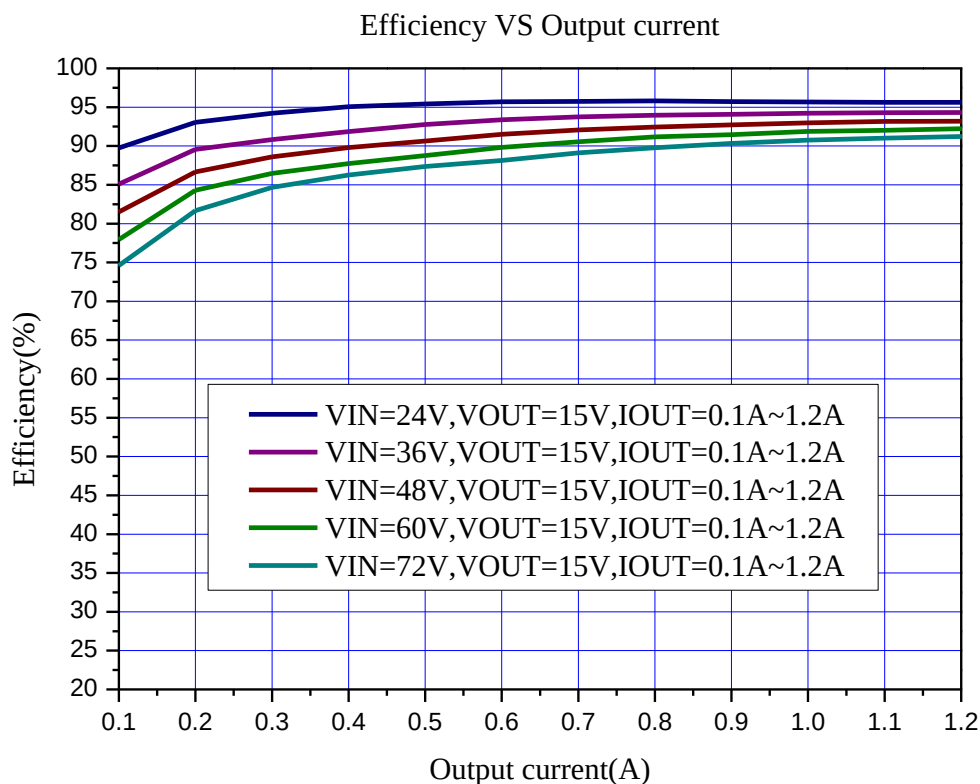


Figure8. XL7056 System Application (Efficiency VS Output Current)

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Typical System Application (VOUT=5V, IOUT=0~2.1A)

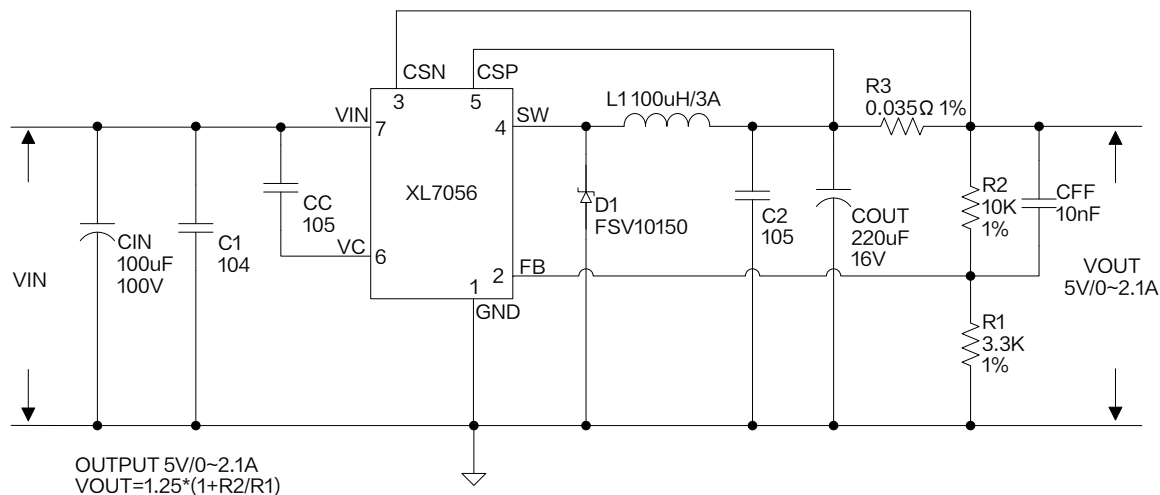


Figure9. XL7056 System Application (VOUT=5V, IOUT=0~2.1A)

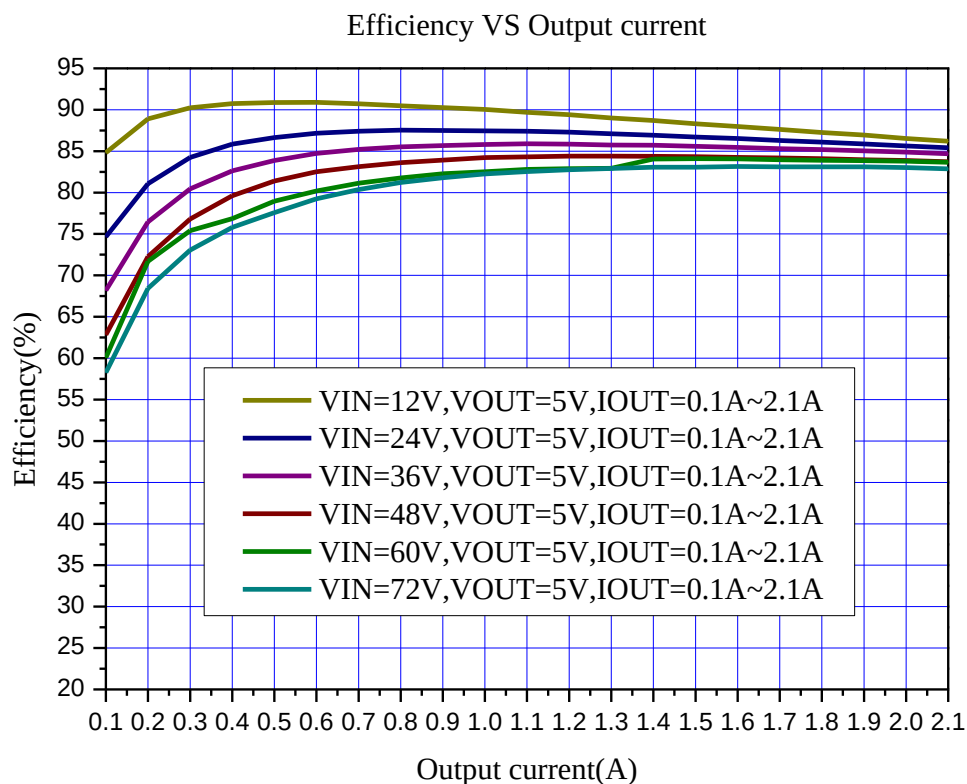


Figure10. XL7056 System Application (Efficiency VS Output Current)

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Typical System Application (VOUT=3.3V, IOUT=0~2.1A)

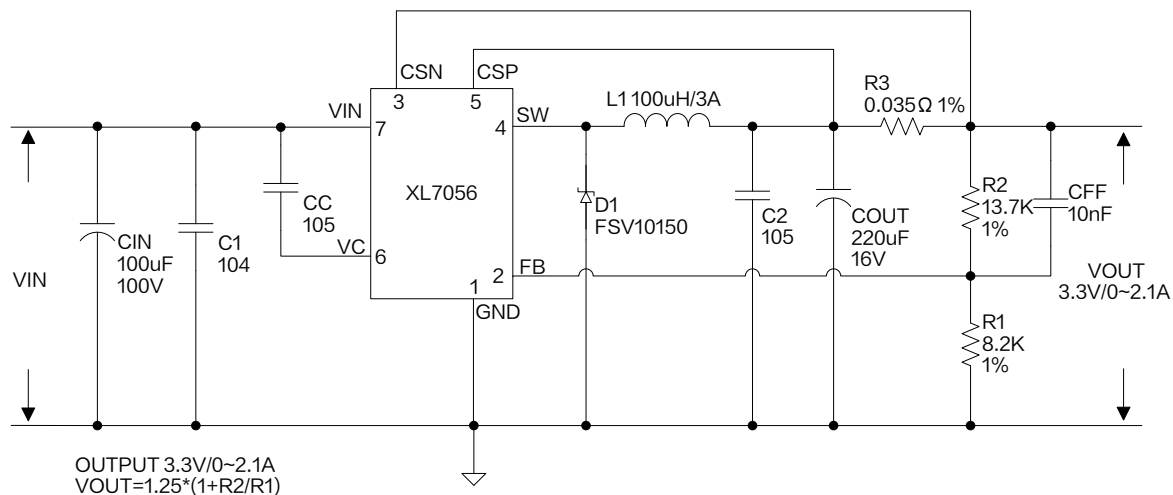


Figure11. XL7056 System Application (VOUT=3.3V, IOU=0~2.1A)

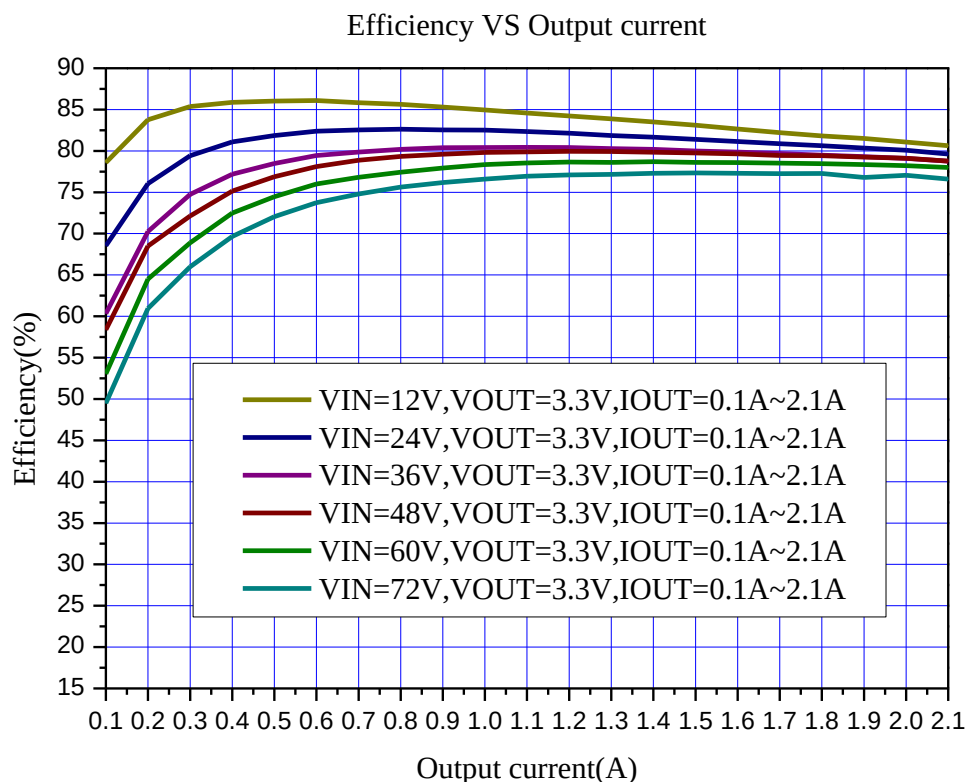


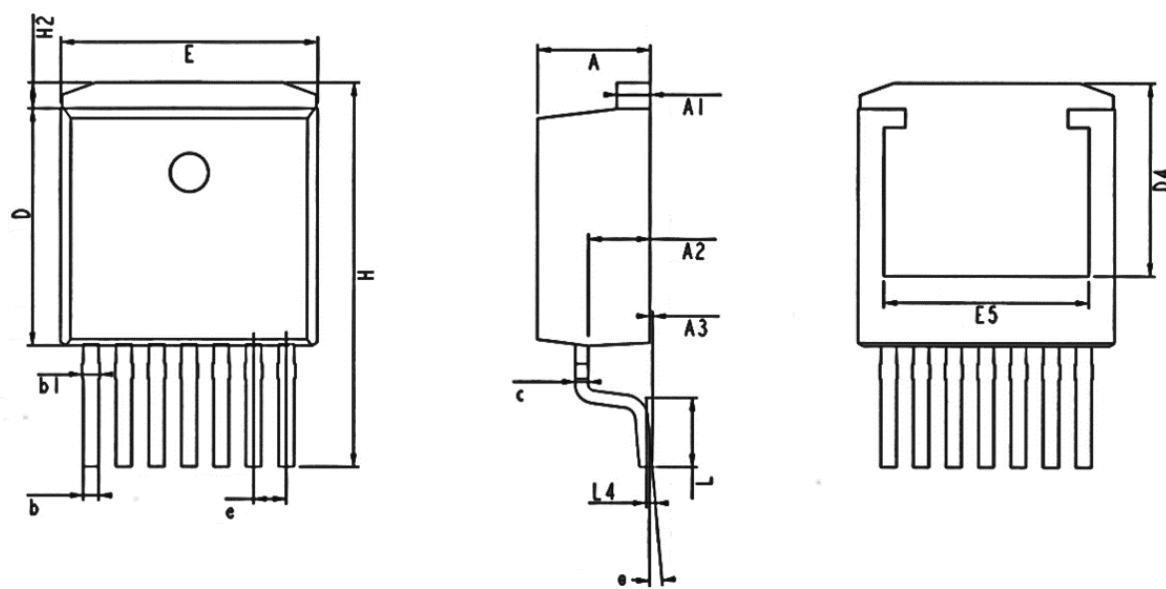
Figure12. XL7056 System Application (Efficiency VS Output Current)

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Package Information

TO263-7L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.25	4.40	4.55	0.167	0.173	0.179
A1	1.20	1.30	1.40	0.047	0.051	0.055
A2	2.25	2.40	2.55	0.088	0.094	0.100
A3	0.00	0.13	0.25	0.000	0.005	0.010
b	0.50	0.60	0.70	0.020	0.024	0.028
b1	0.58	0.68	0.84	0.023	0.027	0.033
c	0.37	0.50	0.60	0.014	0.020	0.024
D	9.05	9.25	9.45	0.356	0.364	0.372
D4	6.90	—	—	0.271	—	—
E	9.80	10.00	10.20	0.386	0.394	0.402
E5	7.25	—	—	0.285	—	—
e	1.17	1.27	1.37	0.046	0.050	0.054
H	14.60	15.00	15.35	0.575	0.591	0.604
H2	0.80	1.00	1.20	0.031	0.039	0.047
L	2.40	2.70	3.00	0.094	0.106	0.118
L4	0.25 REF.			0.010 REF.		
θ	0°	5°	8°	0°	5°	8°

2.1A 100KHz 100V Buck DC to DC Converter**XL7056****Important Notice**

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