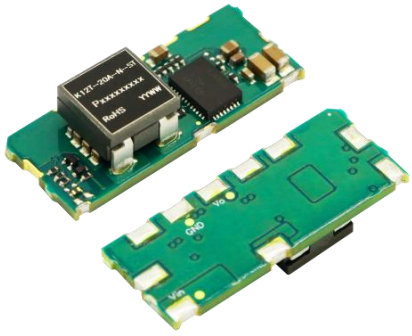
DC/DC Converter

K12T-20A-P(N)-ST Series

MORNSUN®

Non-isolated & Regulated Single 20A Output POL Power Converter



RoHS

FEATURES

- Output current up to 20A, efficiency up to 95%
- Wide operating voltage: 4.5V -14V, output voltage: 0.6-5.5V
- Power good: open-drain
- Remote SENSE+, SENSE-
- Over current/ temperature/short circuit protection
- Operating temperature range -40℃ to +85℃
- TUV/RoHS/EN62368 compliant
- Compliant High-speed transient response
- SMD package: 33.02*13.46*7.7mm

K12T-20A-P(N)-ST series are high efficiency, non-isolated POL switching regulators with 20A load capacity, 4.5V-14V input voltage range, 0.6V-5.5V precisely adjustable output voltage, high conversion efficiency, fast transient response speed, output short circuit protection, output over-current protection, remote compensation and positive/negative logic control, etc., which meet the requirements of DOSA2 generation standard package, in line with RoHS/TUV/EN62368 standards. It is widely used in communication, computer network industry, and power distributed architecture, workstations, servers, LANs/WANs. Providing high current with fast transient response for high speed chips in FPGA, DSP, ASICs.

Selection Guide

Part No.	Input Voltage (VDC)		Output		Efficiency(%) Typ/Min	Capacitive Load(μF) Max.
	Nominal (Range)	Max*	Voltage(VDC) (Range)	Current (A) Max/Min		
K12T-20A-P-ST	12 (4.5-14)	15	0.6-5.5	20/0	95/92	5000
K12T-20A-P-ST						

Notes: * 1. Absolute maximum stress rating without damage (not recommended).
2. Unless otherwise specified, parameters in this table were measured under the 5VDC output voltage.
3. Other: Vin≥Vo+2.2V when Vo > 2.5V, Vin≥Vo+3V when Vo > 3.3V

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (no-load)	Nominal input voltage,Vo=0.6V		--	50	--	mA
Start-up Voltage			--	--	4.5	VDC
Reverse Polarity Input			Avoid / Not protected			
Hot Plug			Unavailable			
Input Filter			Capacitor filter			
Ctrl*	Module on	K12T-20A-P-ST	TTL High (2VDC to 5.5VDC) or open			
		K12T-20A-N-ST	GND (0 to 0.8VDC) or open			
	Module off	K12T-20A-P-ST	GND Low level (0 to 0.8VDC)			
		K12T-20A-N-ST	TTL High (2VDC to 5.5VDC)			
	Input current when off		--	4.3	6	mA

Notes: * 1.The Ctrl pin voltage is referenced to input GND. K12T-20A-P-ST is a positive logic control, and K12T-20A-N-ST is a negative logic control
2.Other: Vin≥Vo+2.2V when Vo > 2.5V, Vin≥Vo+3V when Vo > 3.3V

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Room temperature, input voltage range, 0%Io~100%Io, external TRIM resistance accuracy less than 0.1%		--	--	±1.5	%
	Room temperature, input voltage range, 0%Io~100%Io, external TRIM resistance accuracy less than 1%		--	±1.5	±2	
Linear Adjustment Deviation	25℃	V_O<2.5V	--	--	±20	mV
		V_O≥2.5V	--	--	±30	
Load Adjustment Deviation	25℃	V_O<2.5V	--	--	±20	
		V_O≥2.5V	--	--	±30	
Ripple & Noise*	20MHz bandwidth, CIN=470uF(Polymer)+22uF*4 (ceramic), C0=100uF*4 (ceramic)+330uF*2(Polymer)+1uF (ceramic)		--	30	60	mVp-p
Trim			0.6	--	5.5	VDC
Temperature Coefficient	100% load		--	±0.2	--	%/℃
Transient Response Deviation	25℃, Vin=12V, CIN=470uF(Polymer)+22uF*4 (ceramic), C0=100uF*4 (ceramic)+330uF*2(Polymer)+1uF (ceramic), 50%-100%-50% load, 2.5A/uS	V_O=0.6	--	±30	--	mV
		V_O=1	--	±35	--	
		V_O=1.2	--	±40	--	
		V_O=1.8	--	±45	--	
		V_O=2.5	--	±51	--	
		V_O=3.3	--	±55	--	
		V_O=5	--	±60	--	
Over-current Protection	Vin=12V		25	30	35	A
Short-circuit Protection			Continuous, self-recovery			

Notes: * 1. CIN=470uF(Polymer)+22uF*4 (ceramic), C0=100uF*4 (ceramic)+330uF*2(Polymer)+1uF (ceramic)

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	see Fig. 1	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	600	--	KHz
SYNC	High-level input voltage	2	--	--	V
	Low-level input voltage	--	--	0.8	
SYNC Frequency	Vin=12V	650	--	1000	
MTBF	MIL-HDBK-217F@25℃	61897	--	--	K hours
MSL	IPC/JEDEC J-STD-020D.1	MSL3			

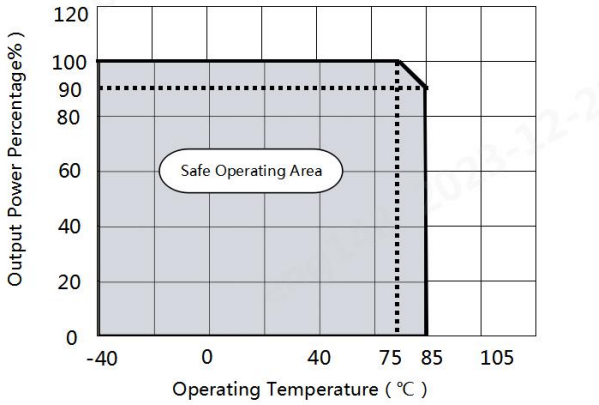
Notes: * The SYNC frequency is affected by the maximum duty cycle and the minimum on-time

Physical Specifications

Dimensions	33.02*13.46*7.7mm
Weight	5.5g (Typ.)
Cooling Method	Free air convection or forced convection

Typical Characteristic Curves

Temperature Derating Curve(Vin=12V,3.3V < Vo≤5V)



Temperature Derating Curve(Vin=12V,Vo≤3.3V)

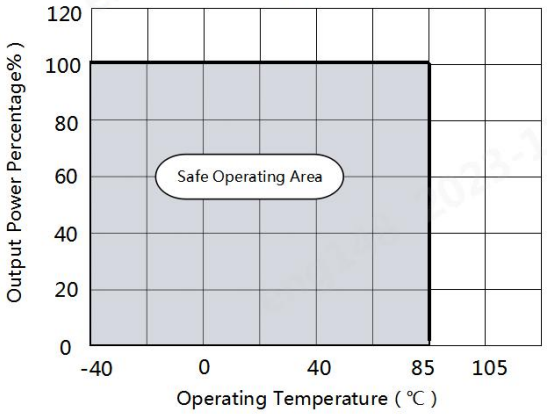
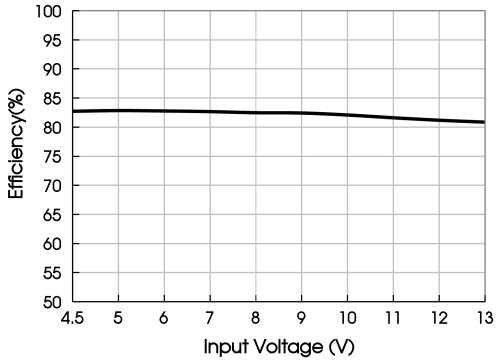
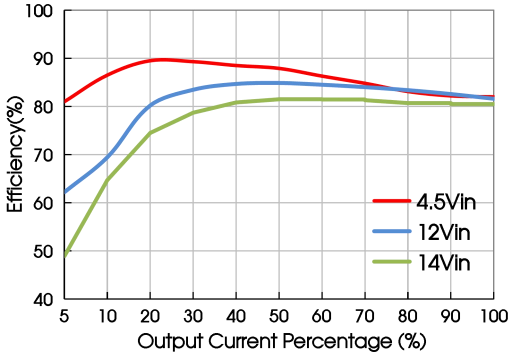


Fig. 1

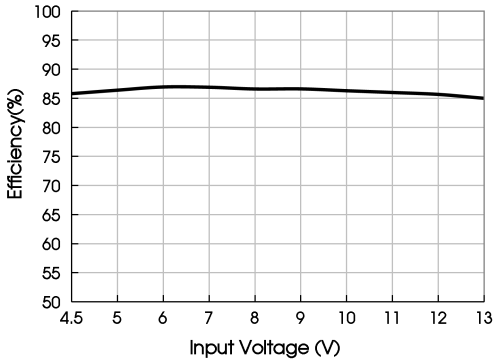
Efficiency Vs Input Voltage (Vo=0.6V,Full Load)



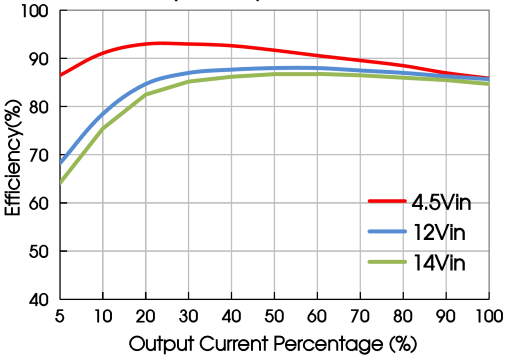
Efficiency Vs Output Load（Vo=0.6V）



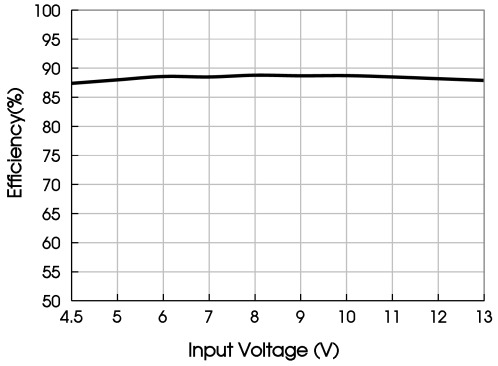
Efficiency Vs Input Voltage (Vo=1V,Full Load)



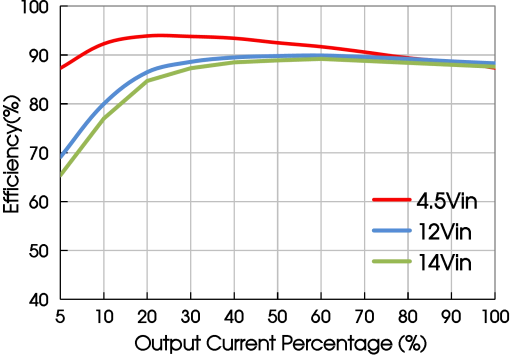
Efficiency Vs Output Load（Vo=1V）



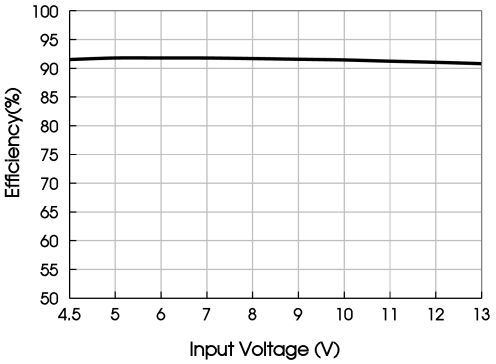
Efficiency Vs Input Voltage (Vo=1.2V,Full Load)



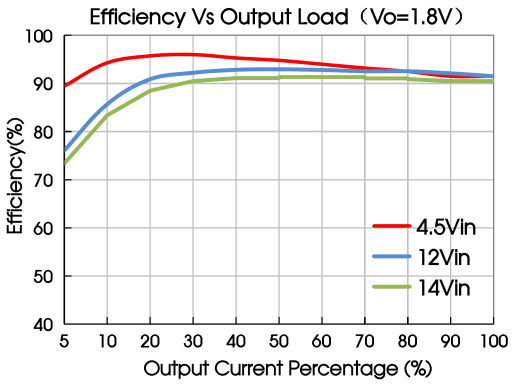
Efficiency Vs Output Load（Vo=1.2V）



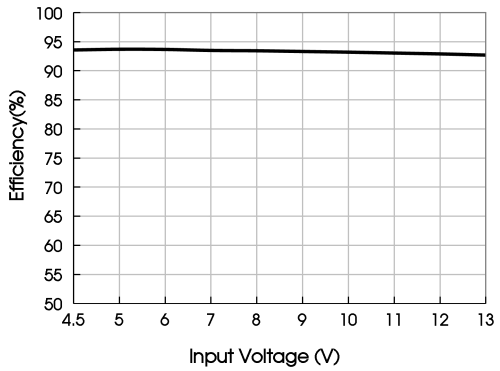
Efficiency Vs Input Voltage (Vo=1.8V,Full Load)



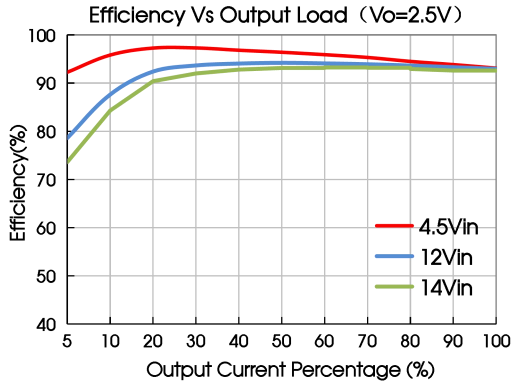
Efficiency Vs Output Load（Vo=1.8V）



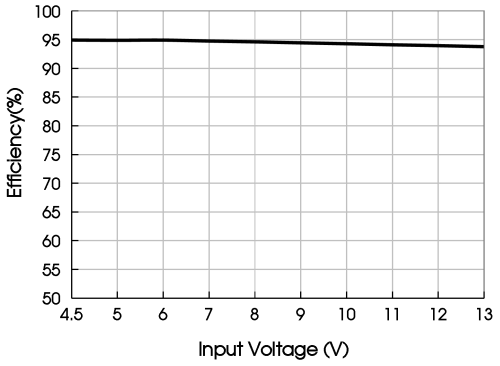
Efficiency Vs Input Voltage (Vo=2.5V,Full Load)



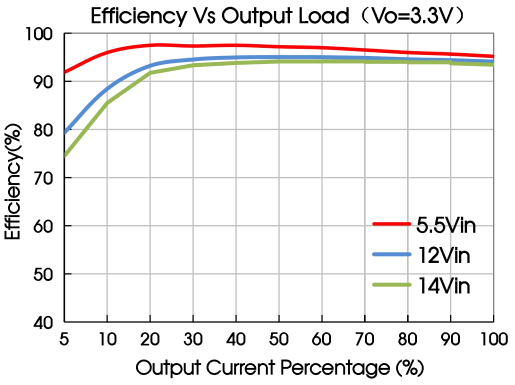
Efficiency Vs Output Load（Vo=2.5V）



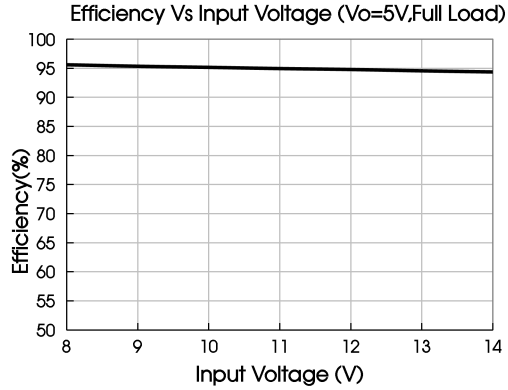
Efficiency Vs Input Voltage (Vo=3.3V,Full Load)



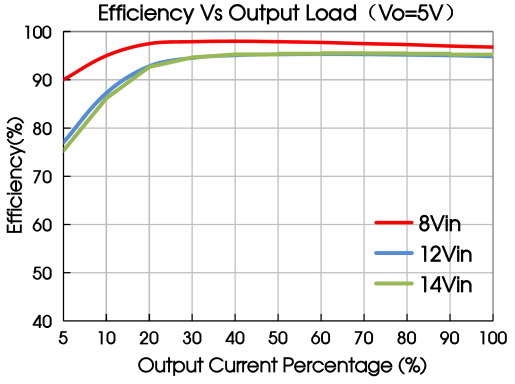
Efficiency Vs Output Load（Vo=3.3V）



Efficiency Vs Input Voltage (Vo=5V,Full Load)

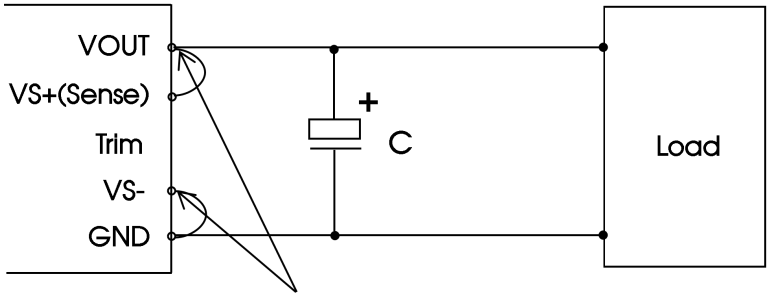


Efficiency Vs Output Load（Vo=5V）



Sense and PGD Application

1. Remote sense connection if not used

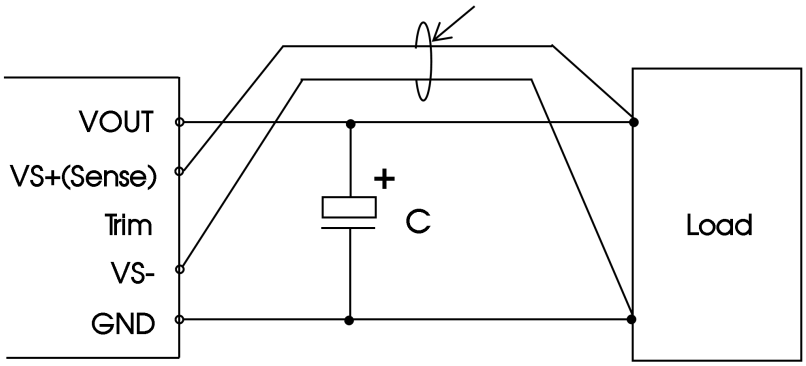


The line must be kept as short as possible

Notes:
1. If the sense function is not used for remote regulation the user must connect the VS+(Sense) to VOUT and VS- to GND at the DC-DC converter pins and will compensate for voltage drop across pins only;
2. The connections between sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

2. Remote sense connection used for compensation

Suggest to use twisted pair



Notes:
1. Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used;
2. We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load inorder to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range;
3. Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

3. PGOOD Application

PGOOD recommended circuit

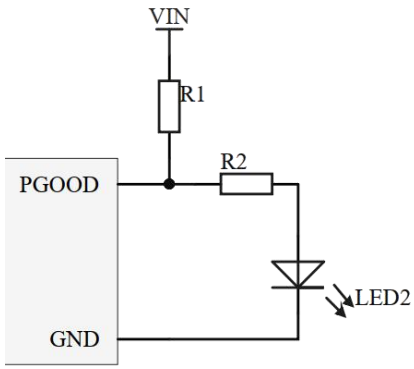


Table 1

VIN	5VDC
R1	100kΩ
R2	25-500Ω
LED2	MS-PT2012ZGSC

Notes:
1. PGOOD is the power good detection pin. When the product is working normally, PGOOD at a high impedance, and LED2 on. when the product is abnormal, PGOOD is pulled to low level (0V-0.8V), and LED2 off;
2. PGOOD pin applied voltage is recommended at 5VDC.

Design Reference

1. Typical application

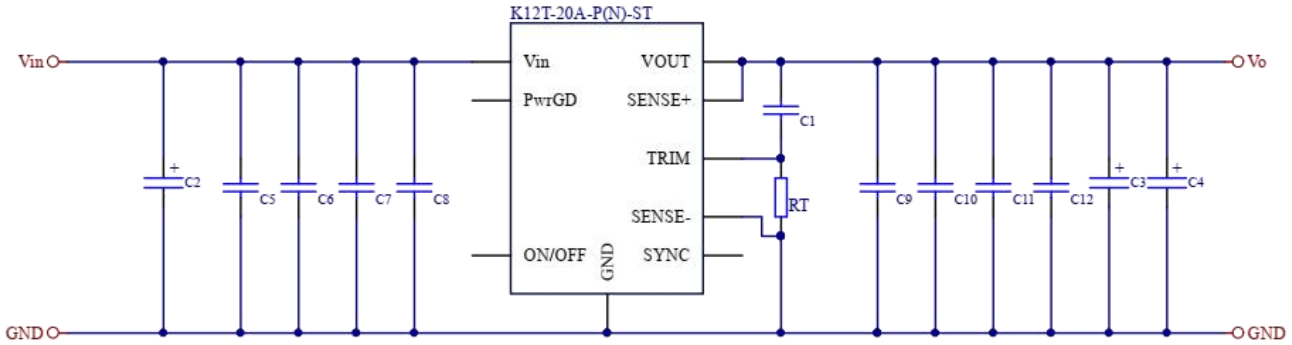


Table 2

C2	470uF(Polymer)
C5, C6, C7, C8	22uF（Ceramic）
C1	470pF(Vo≤2.5V), NC(Vo>2.5V)
C9, C10, C11, C12	100uF（Ceramic）
C3, C4	330uF(Polymer)

Notes:
1. 100 μF polymer capacitors (C2) is required and should be connected close to the pin terminal, to ensure the stability of the module.
2. To reduce the output ripple furtherly, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead.
3. Refer to Table 1 for Cin and Cout capacitor values.
4. Converter cannot be used for hot swap and with output in parallel.

2. Trim Function for Output Voltage Adjustment (open if unused)

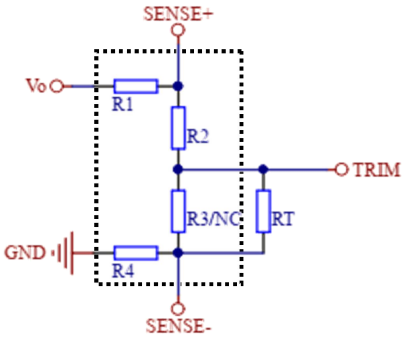


Fig. 2 TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor (R_T) values:

$$R_T(K\Omega) = \frac{12}{V_O - 0.6}$$

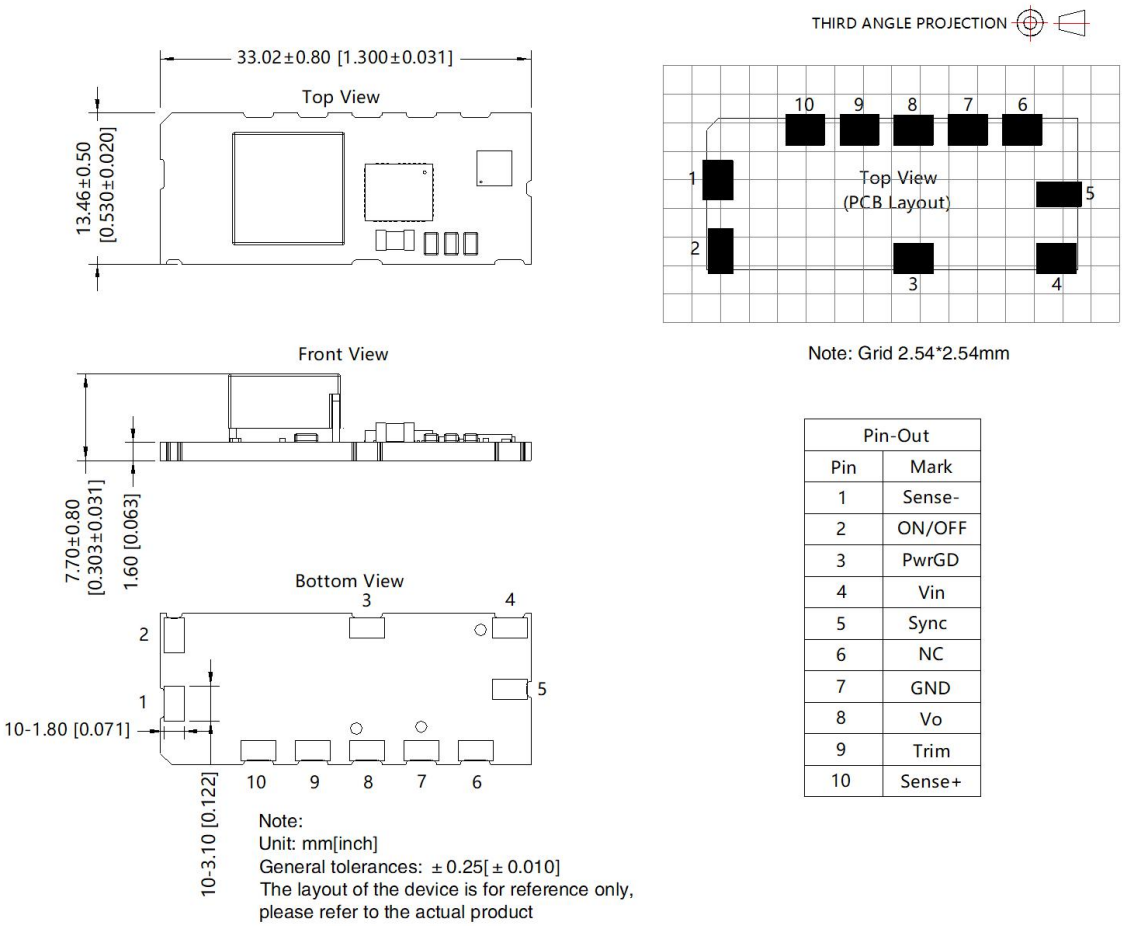
Note: R_T : Resistance of Trim; Vo: The trim up voltage.

Table 3

Output voltage（Vo）	R_T(kΩ)
0.6	open
1	30
1.2	20
1.8	10
2.5	6.315
3.3	4.444
5	2.727

3. For additional information please notes on www.mornsun-power.com

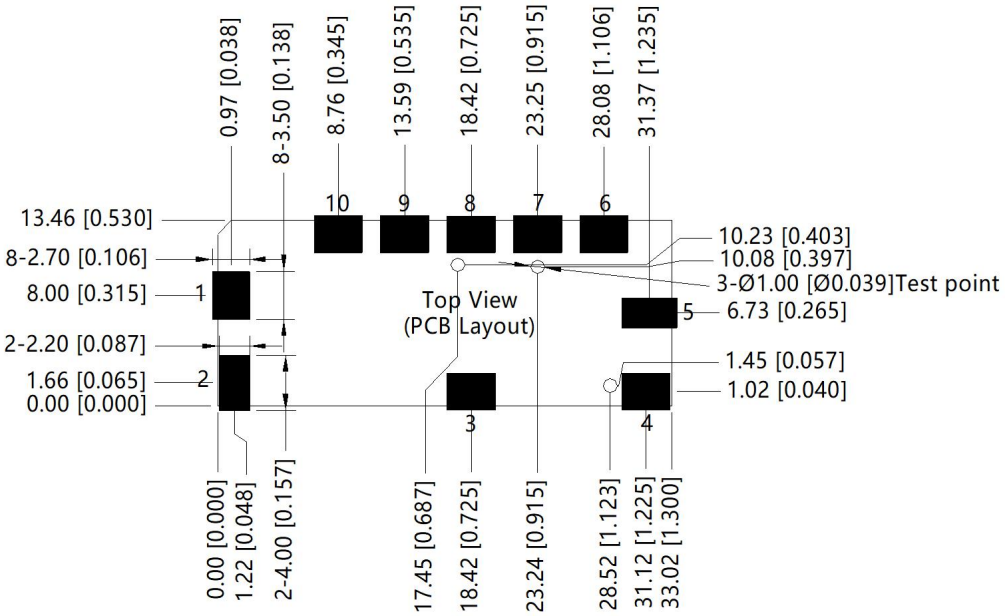
Mechanical Specifications



Pin-Out	
Pin	Mark
1	Sense-
2	ON/OFF
3	PwrGD
4	Vin
5	Sync
6	NC
7	GND
8	Vo
9	Trim
10	Sense+

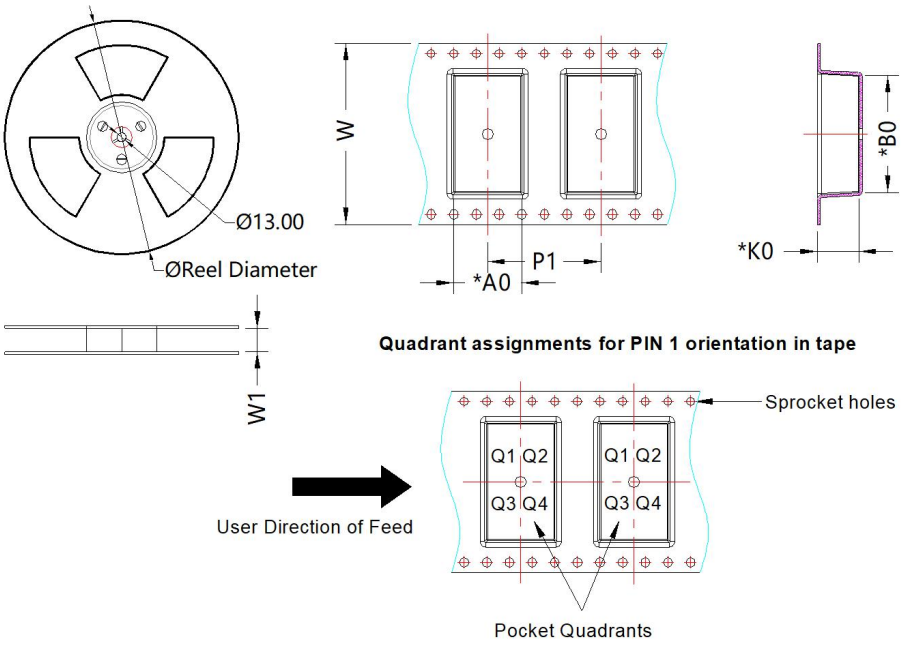
Note:
Unit: mm[inch]
General tolerances: ±0.25[±0.010]
The layout of the device is for reference only, please refer to the actual product

Recommended PAD Pattern



Note:
Unit: mm[inch]
1, 3, 4, 6, 7, 8, 9, 10 are equal
2, 5 are equal

Tape and Reel Info



Device	Package Type	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
K12T-20A-P(N)-ST	SMD	10	270	330.0	56.4	14.6	34.1	8.9	24	56	Q2

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210344;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage, 5VDC output voltage and rated output load;
4. All index testing methods in this datasheet are based on company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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