28V Input Voltage, 2A Synchronous Step-Down Converter

DESCRIPTION

ETA2847 is a wide input range, high-efficiency synchronous step-down switching regulator, capable of delivering up to 2A output current. It adopts an adaptive COT control scheme that enables very fast transient response and provides a very smooth transition when the output varies from light load to heavy load. During light load, ETA2847 goes into a PFM mode that saves switching loss achieving high efficiency. The adaptive COT control also maintains a constant switching frequency across line and load. An OVP function protects the IC itself and its downstream system against input voltage surges.

ETA2847 is available in SOT23-6 Packages.

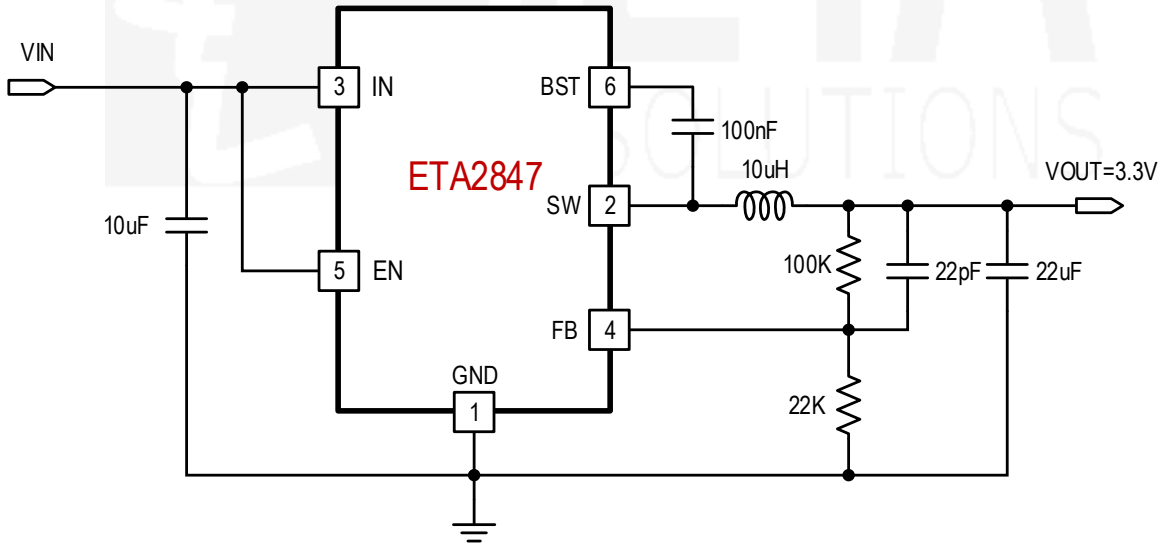
FEATURES

- Wide Input Operating Range: 4.5V to 28V
- 34V Input Standoff Voltage
- High Efficiency up to 90%
- PFM Mode at light load
- Capable of Delivering 2A
- No External Compensation Needed
- COT Mode Control
- Logic Control Shutdown
- UVLO, OVP and Thermal shutdown
- Available in SOT23-6 Package
- RoHS Compliant

APPLICATIONS

- Smart Meters
- Industrial Applications
- Automotive Applications

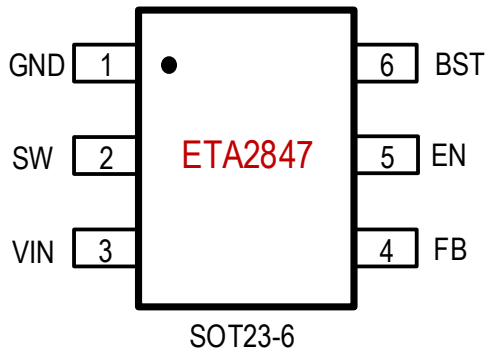
TYPICAL APPLICATION



ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA2847S2G	SOT23-6	CHYW	3000

PIN CONFIGURATION



SOT23-6

ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

VIN Voltage.....-0.3V to 34V
SW, EN Voltage.....–0.3V to VIN+0.3V
BST Voltage.....–0.3V to SW+6V
FB Voltage.....–0.3V to 6V
SW to ground current .....Internally limited
Operating Temperature Range .....–40°C to 85°C
Storage Temperature Range .....–55°C to 150°C

Thermal Resistance	θ_{JA}	θ_{JC}	
SOT23-6	220	110	°C /W

ELECTRICAL CHARACTERISTICS

(V_{IN} = 12V, unless otherwise specified. Typical values are at T_A = 25°C.)

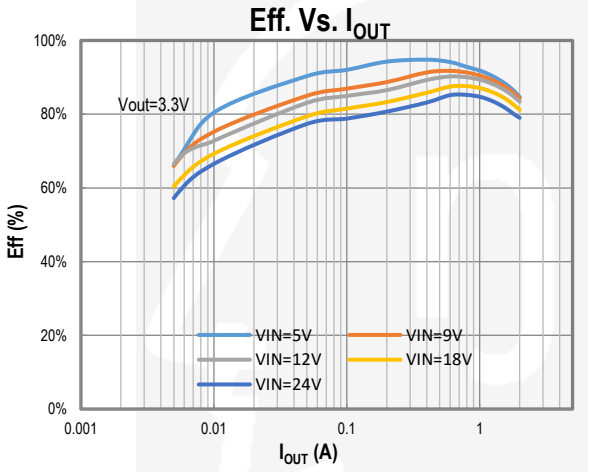
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Standoff Voltage		34			V
Input Voltage Range		4.5		28	V
Input UVLO	Rising, Hysteresis=200mV		4.2		V
Input OVP	Rising, Hysteresis=2V		32		V
Input Supply Current	V_{FB} =0.85V		0.32		mA
Input Shutdown Current			8		μA
FB Feedback Voltage		0.581	0.596	0.611	V
FB Input Current			0.01		μA
Switching Frequency			500		KHz
Maximum Duty Cycle			100		%
High Side Switch On Resistance	I_{SW} =100mA		150		mΩ
Low Side Switch On Resistance	I_{SW} =100mA		130		mΩ
High Side Switch Current Limit			3.2		A
Low Side Switch Current Limit			2.3		A
SW Leakage Current	V_{SW}=12V or 0V, EN= GND			10	μA
EN Input Current	V_{IN}=12V, V_{EN} =5V		1	5	μA
EN Input Voltage	Rising, Hysteresis=180mV		1.28		V
Thermal Shutdown	Hysteresis=40°C		150		°C

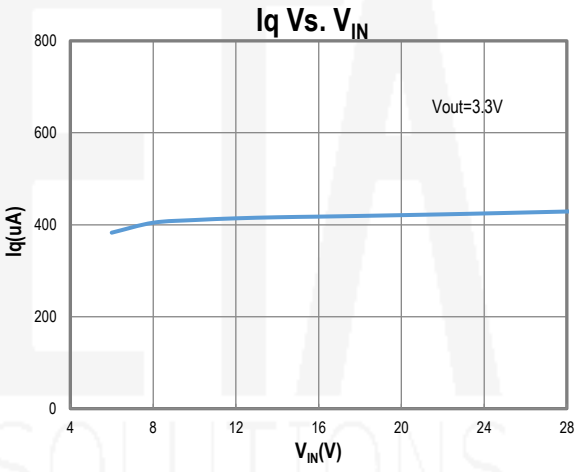
PIN DESCRIPTION

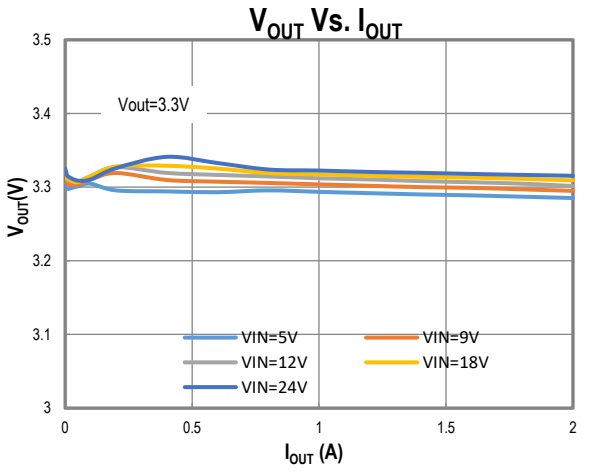
PIN #	NAME	DESCRIPTION
1	GND	Ground
2	SW	Inductor Connection. Connect an inductor between SW and the regulator output.
3	IN	Supply Voltage. Bypass with a 10μF ceramic capacitor to GND
4	FB	Feedback Input. Connect an external resistor divider from the output to FB and GND to set V_{OUT}
5	EN	Enable pin for the IC. Drive this pin high to enable the part, low to disable.
6	BST	Bootstrap pin. Connect a 100nF capacitor from this pin to SW

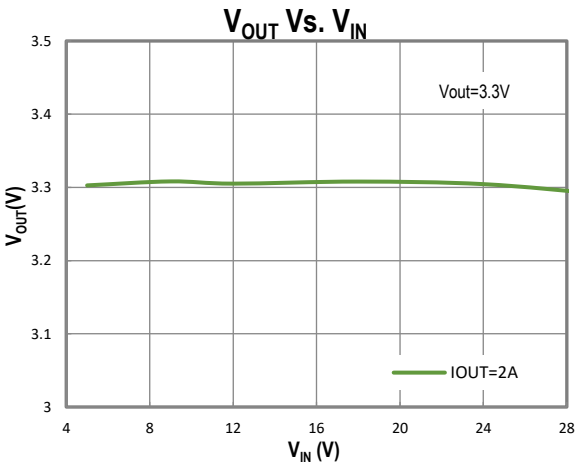
TYPICAL CHARACTERISTICS

(Typical values are at T_A = 25°C unless otherwise specified.)





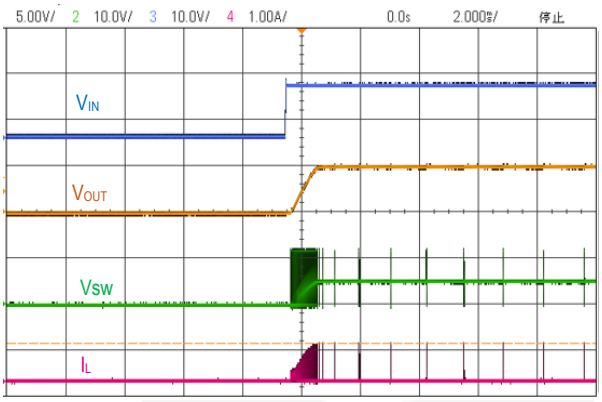




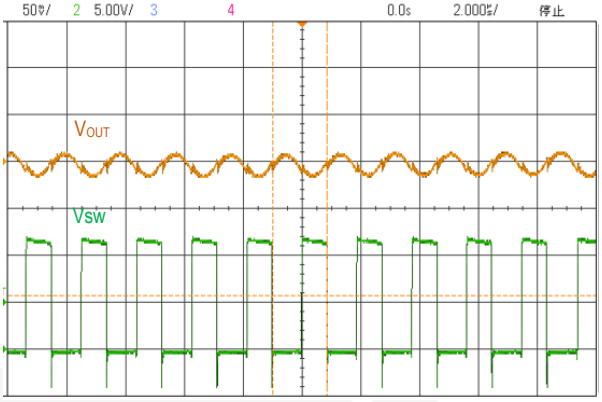
TYPICAL CHARACTERISTICS Cont'd

(Typical values are at T_A = 25°C unless otherwise specified.)

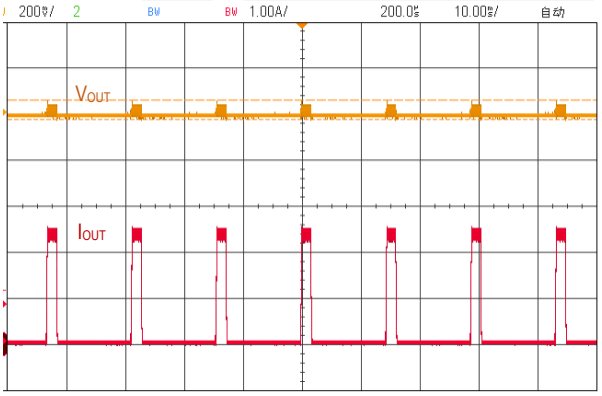
Start-up Waveform with V_{IN}
V_{IN}=12V, V_{OUT}=5V, I_{OUT}=0A



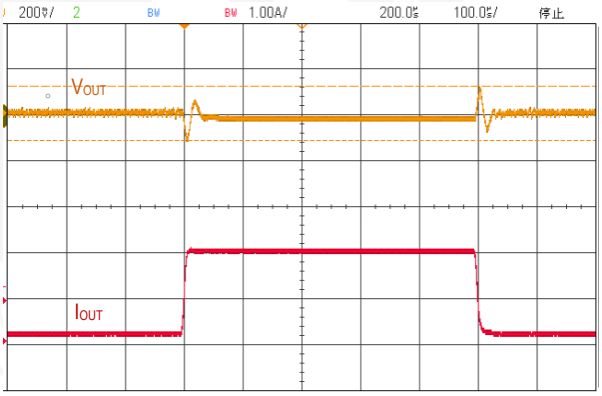
Switching Waveform
V_{IN}=12V, V_{OUT}=5V, I_{OUT}=2A



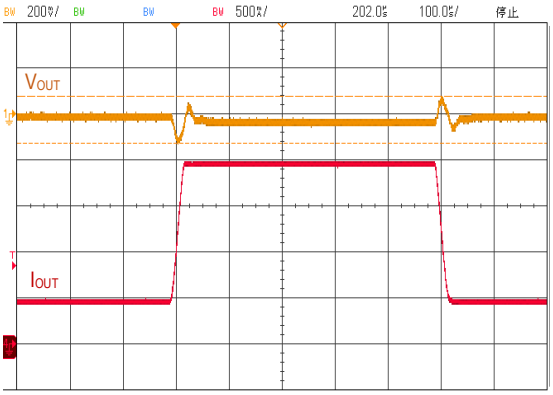
Short-Circuit Response
V_{IN}=12V, V_{OUT}=3.3V



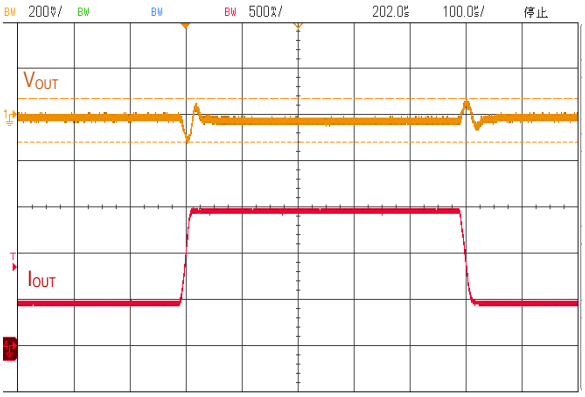
Load Transient Response
V_{IN}=12V, V_{OUT}=3.3V, I_{OUT}=0.2A~2A~0.2A



Load Transient Response
V_{IN}=12V, V_{OUT}=5V, I_{OUT}=0.5A~2A~0.5A



Load Transient Response
V_{IN}=12V, V_{OUT}=5V, I_{OUT}=0.5A~1.5A~0.5A



FUNCTIONAL DESCRIPTIONS

Loop Operation

The ETA2847 is a synchronous buck regulator ICs that integrates the adaptive COT control, top and bottom switches on the small die to minimize the switching transition loss and conduction loss.
The ETA2847 is a wide input range, high-efficiency DC-to-DC step-down switching regulator, capable of delivering up to 2A output current, integrated with a 150mΩ high side MOSFET. It adopts an adaptive COT control scheme that enables very fast transient response and provides a very smooth transition when the output varies from light load to heavy load. It compares the sum of the FB voltage and a ripple voltage that mimics the voltage due to the output ESR and capacitance. The constant-on-time timer varies with line to achieve relative constant switching frequency across line.

Light Load Operation

Traditionally, a fixed constant frequency PWM DC-DC regulator always switches even when the output load is small. When energy is shuffling back and forth through the power MOSFET, power is lost due to the finite Rdson of the MOSFET and parasitic capacitances. At light load, this loss is prominent and efficiency is therefore very low. ETA2847 goes into a power save mode during light load, thereby extending the range of high efficiency operation.

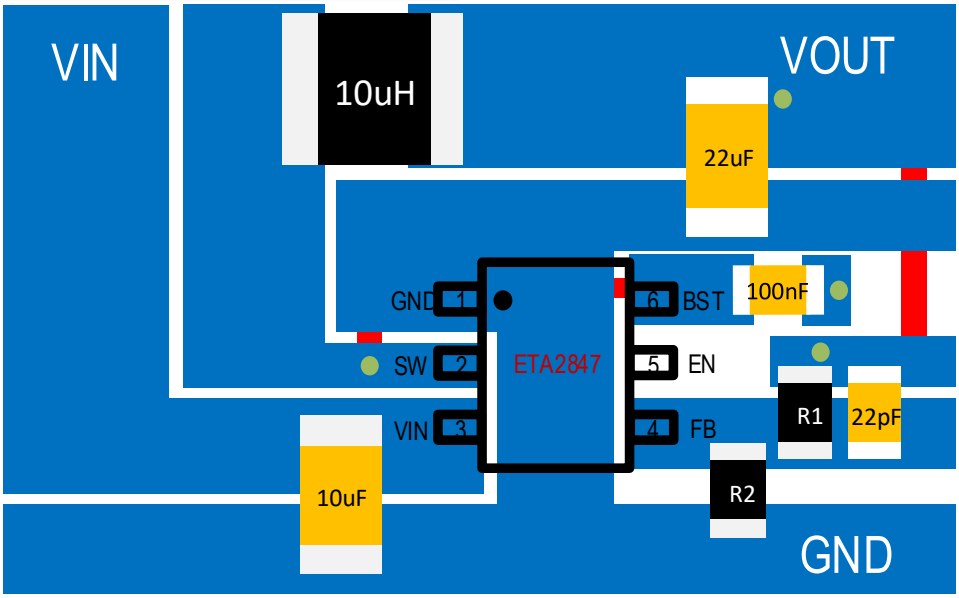
APPLICATION INFORMATION

Setting Output Voltages

Output voltages are set by external resistors. The FB threshold is 0.596V.

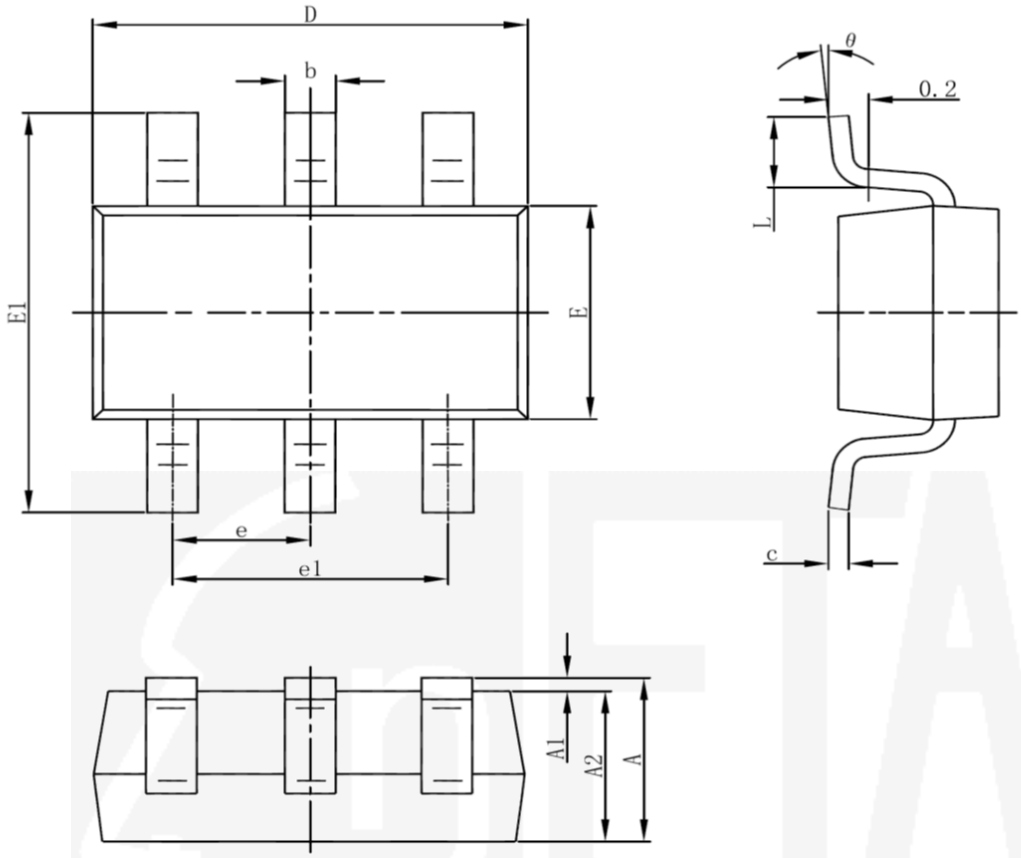
$R_{TOP} = R_{BOTTOM} \times [(V_{OUT} / 0.596) - 1]$

PCB GUIDELINE



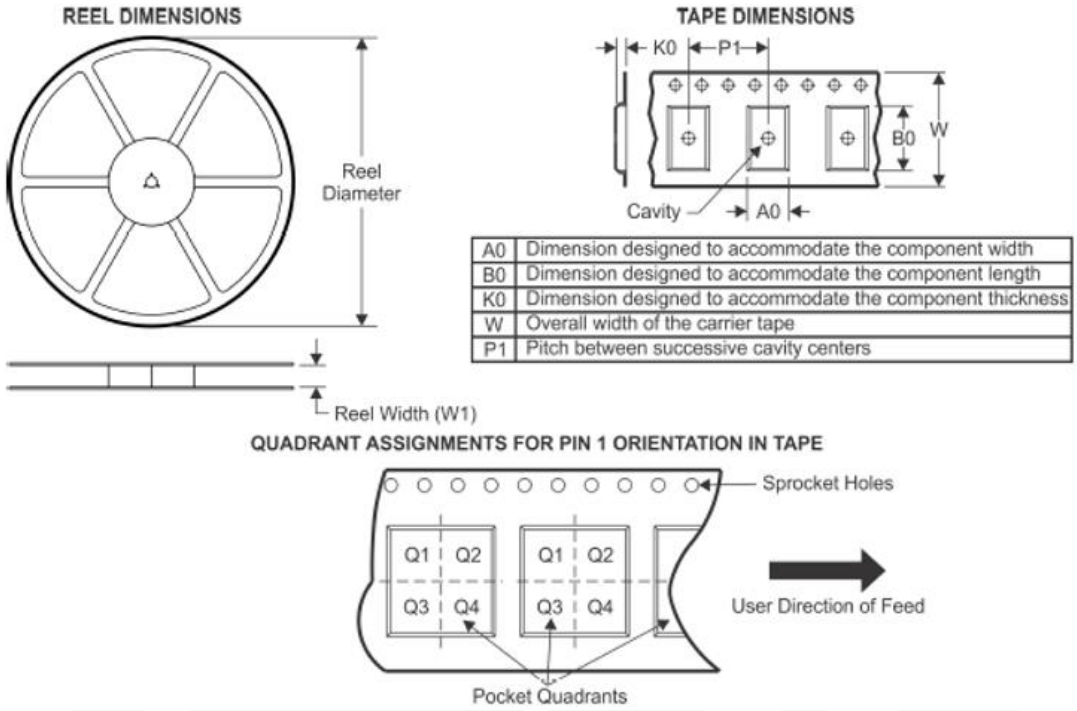
PACKAGE OUTLINE

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
ETA2847S2G	SOT23-6	6	3000	180	9.5	3.17	3.23	1.37	4	8	Q3