

PRELIMINARY



Q25017 20W DC/DC CONVERTER 36-72Vin, +/-14Vout@+/-715mA

Key Features

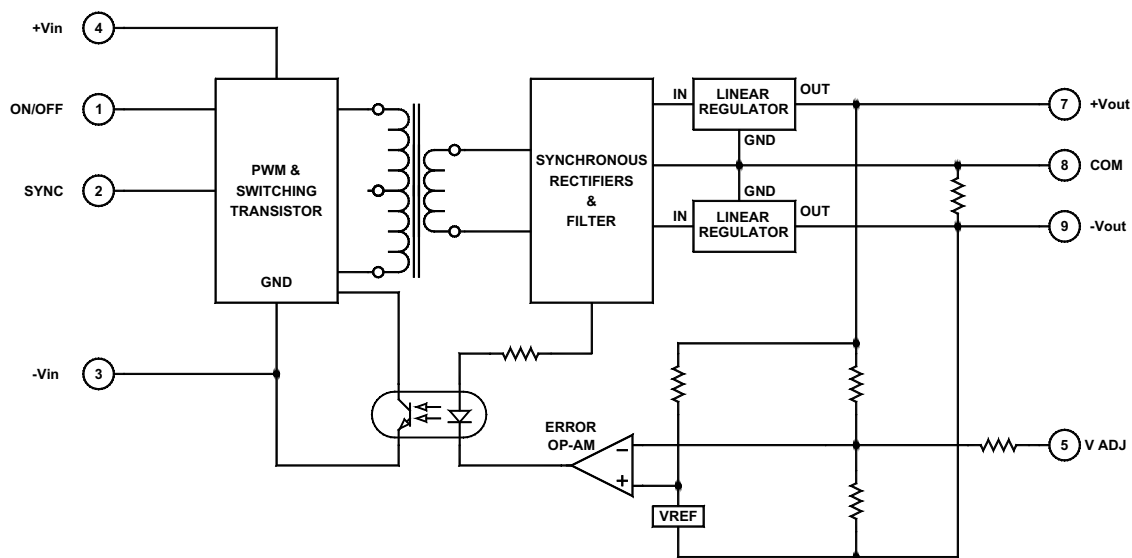
- Efficiency 83%
- Low output noise
- Six-sided shielding
- Input-to-output isolation
- Soft start
- External synchronization of 393KHz
- Short circuit protection
- Thermal protection
- Industry standard pinout



Beta Dyne is protected under various patents, including but not limited to U.S. Patent numbers: 5,777,519; 6,188,276; 6,262,901; 6,452,818; 6,473,3171.

Functional Description

The Q25017 is a dual DC/DC converter that accepts 36-72Vin and provides +/-14Vout @ +/-715mA. Standard features include input undervoltage protection, thermal protection, and short circuit protection. The converter is designed to synchronize to an external clock frequency of a 393kHz. The output rectification is followed by a low dropout linear regulator which makes it possible to achieve up to 83% efficiency with less than 20mV output noise. The converter is packaged in a 1.00x2.00x0.450 inch metal case with six-sided shielding.



Typical Block Diagram

Electrical Specifications

INPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		36	48	72	Vdc
Input Startup Voltage		33			Vdc
Input Overvoltage Shutdown		73			Vdc
Input Filter	C				
No Load Input Current	V _{in} = 48V		25		mA
Full Load Input Current	V _{in} = 48V		500		mA
Input Surge Current (20µS Spike)				10	A
Short Circuit Current Limit	120% Of I _{in} @ Full Load				
Off State Current			20		µA
Remote ON/OFF Control					
Supply ON	Pin 1 Open (Open circuit voltage: 10V Max.)				
Supply OFF	Pin 1 Shorted to GND Pin 3	0		0.6	Vdc
Logic Input Reference	To -V _{in} (GND) Pin 3				
Logic Compatibility	TTL Open Collector or CMOS Open Drain				

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Voltage			+/-14		Vdc
Output Voltage Accuracy	With balanced loads		1	1.5	%
Output Current			+/-715		mA
Output Voltage Adjustment			±5	±10	%
Ripple & Noise	See Figure 1		20		mV
Line Regulation	Minimum V _{in} to maximum V _{in}		±1		%
Load Regulation	10% to FL, with balanced loads		±1		%
Temperature Coefficient @ FL			.01	.02	%/°C
Transient Response Time	50% FL to FL to 50% FL, within 1% of Vo, See Figure 5	100			µS
Short Circuit Protection	By Hiccup Technique				
Output Overvoltage Protection	None				

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency (at full power)			83		%
Isolation Voltage (1 min.), Input to Output ³			1000		Vdc
Isolation Resistance			10 ⁹		Ω
Isolation Capacitance			300		pF
Switching Frequency (F _{sw})			370		kHz
External Sync Frequency (F _E)	See Figure 4 & 5		393		kHz

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×1.00×0.450 in. (50.80×25.40×11.43mm)				
Weight	1.3 oz. (37g)				

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature Range (Ambient) ²		-40		+71	°C
Storage Temperature Range		-55		+125	°C
Maximum Operating Case Temperature ¹				110	
MTBF	per MIL-HNBK-217F(Ground benign, +25 °C)		1.1 x 10 ⁶		hours
Shielding Connection	+Vin for 48Vin				

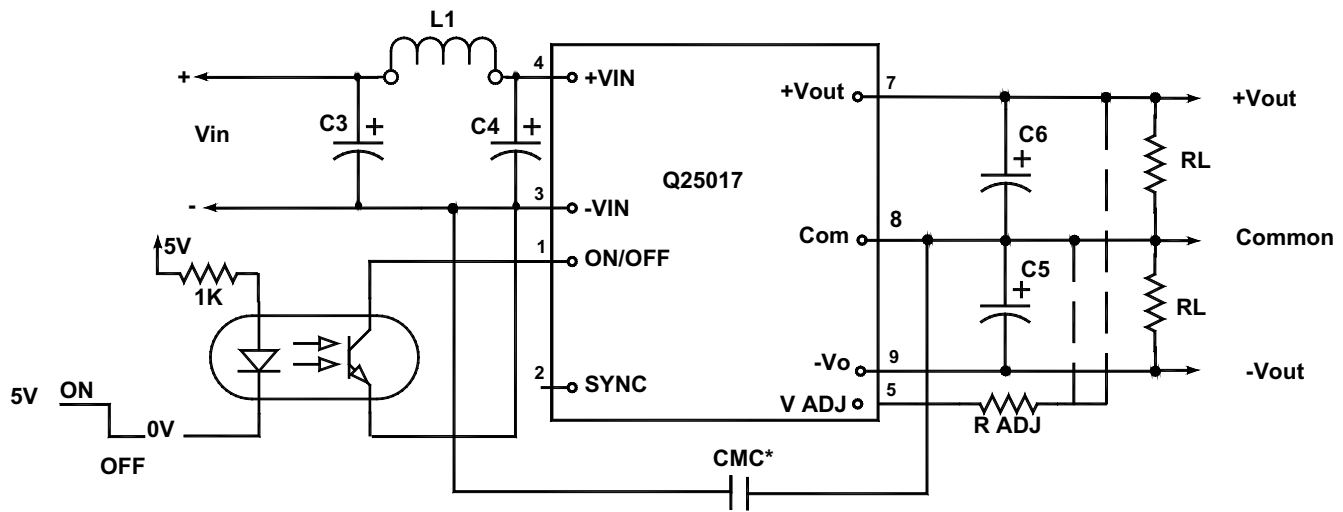


FIGURE 1. Typical connection diagram for Q25017

Part list for Figure 1:

- L1 = 2.2 μ H
- C3 = 50 μ F@100V Electrolytic
- C4 = 50 μ F@100V Electrolytic
- C5,C6 = 47 μ F@25V Low ESR Tantalum
- CMC* = Typically Not Used, Common Mode Capacitor
- CMC = .01 μ F@Vcmc
- Vcmc \geq Than required isolation, voltage can be up to 1500Vdc max

¹ When converter enters thermal protection mode, its duty cycle is reduced momentarily and will resume after its internal temperature (PWM) drops down a few degrees ($^{\circ}$ C). The converter's output behaves similar to hiccup short circuit mode.

² Contact factory for -55° to $+85^{\circ}$ C operating temperature range.

³ Adequate insulation is to be provided to the converters at the end usage as per applicable requirements.

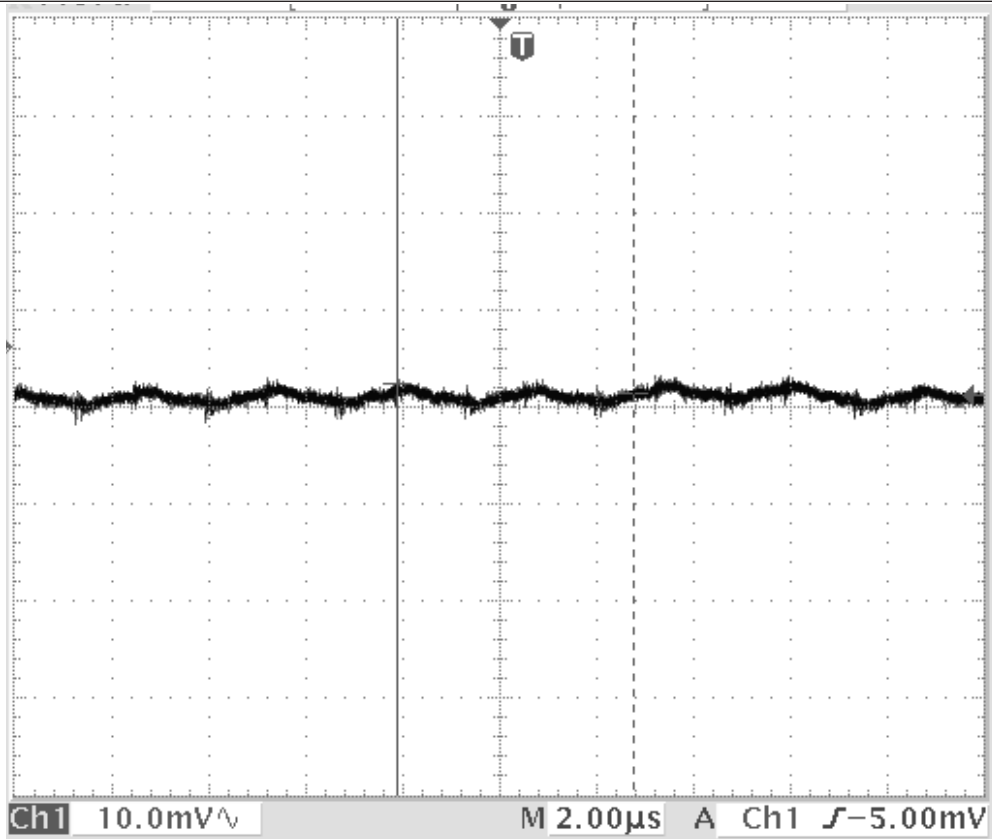


FIGURE 2. Output ripple of $+V_{OUT}$ at full load as shown in Figure 1.

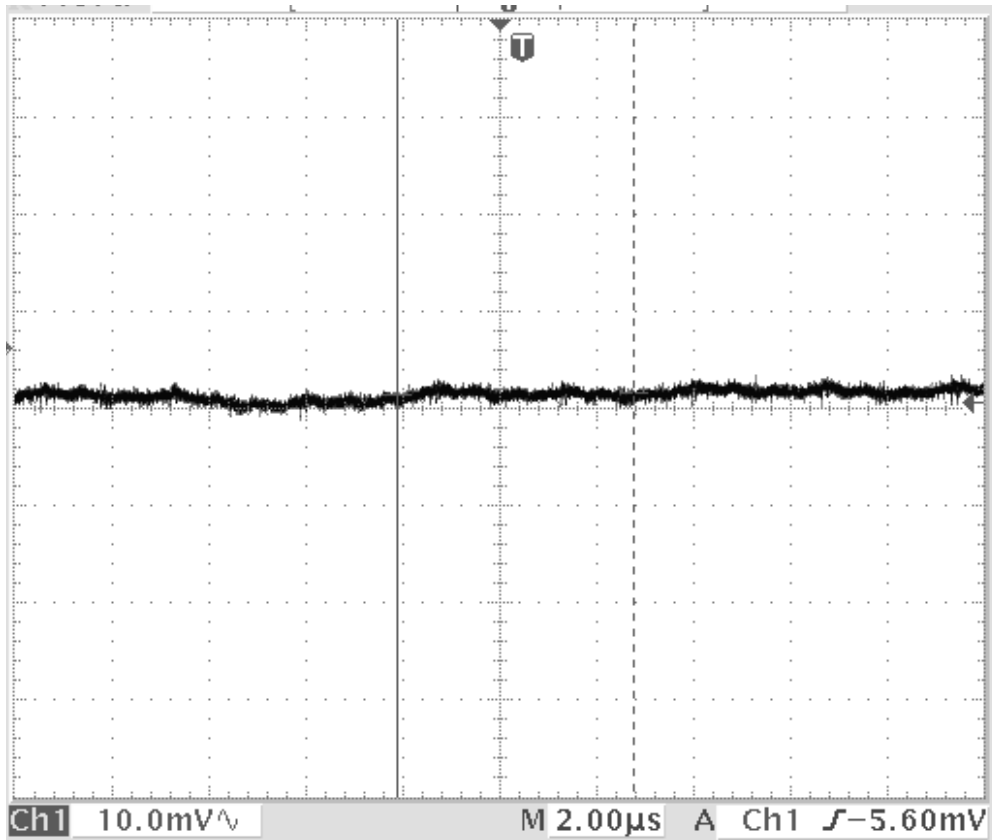


FIGURE 3. Output ripple of $-V_{OUT}$ at full load as shown in Figure 1.

EXTERNAL SYNCHRONIZATION

The SYNC pin can be used to synchronize the internal oscillator to external clock. An open drain output is the recommended interface between the external clock to the Q25017 SYNC pin as shown in Figure 4. The clock pulse width must be greater than 15ns. The external clock frequency must be greater 5% to 10% than the frequency of the Q25017.

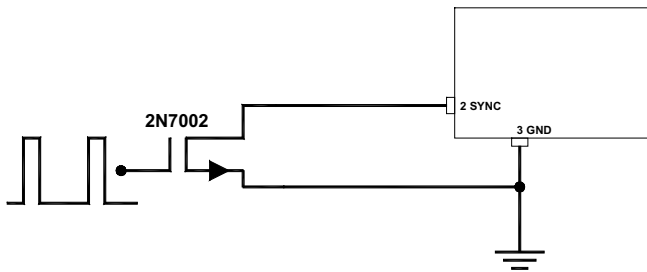


FIGURE 4. SYNC from external clock for Q25017

Multiple Q25017 converters can be synchronized together simply by connecting the converter's SYNC pins together as shown in Figure 5. Care should be taken to ensure the ground potential differences between the converters are minimized. Without the external MOSFET 2N7002, 5 units can be synchronized by connecting all SYNC pins together. In this configuration all the converters will be synchronized to the highest frequency device. The SYNC pin is a CMOS buffer with pull-up current limited to 200micro amps. If the external device forces the SYNC pin low before the internal oscillator ramp completes its charging cycle, the ramp will reset and another cycle begins. If the SYNC pins of multiple Q25017 converters are connected together, the first SYNC pin that pulls low will reset the oscillator ramp of all the other converters. All converters will operate in phase when synchronized using the SYNC feature. Up to five devices can be synchronized using this method.

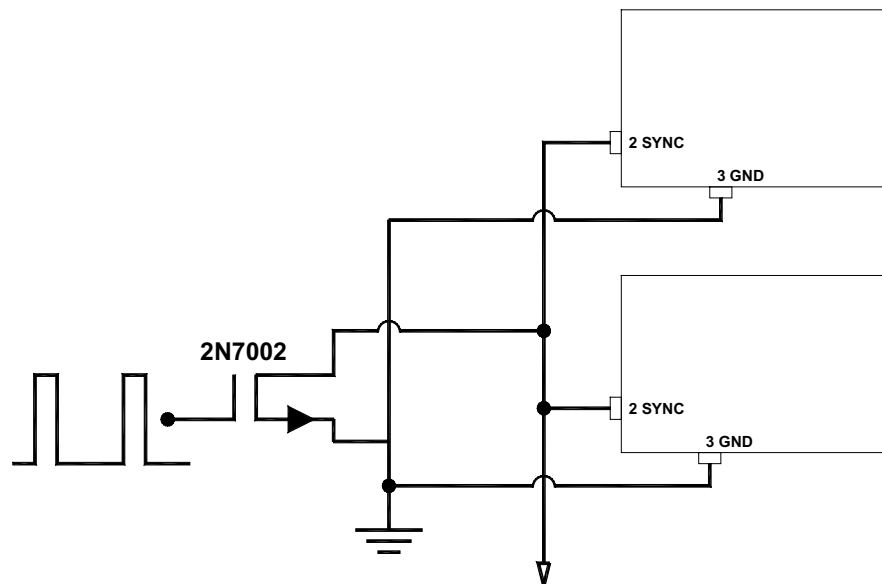
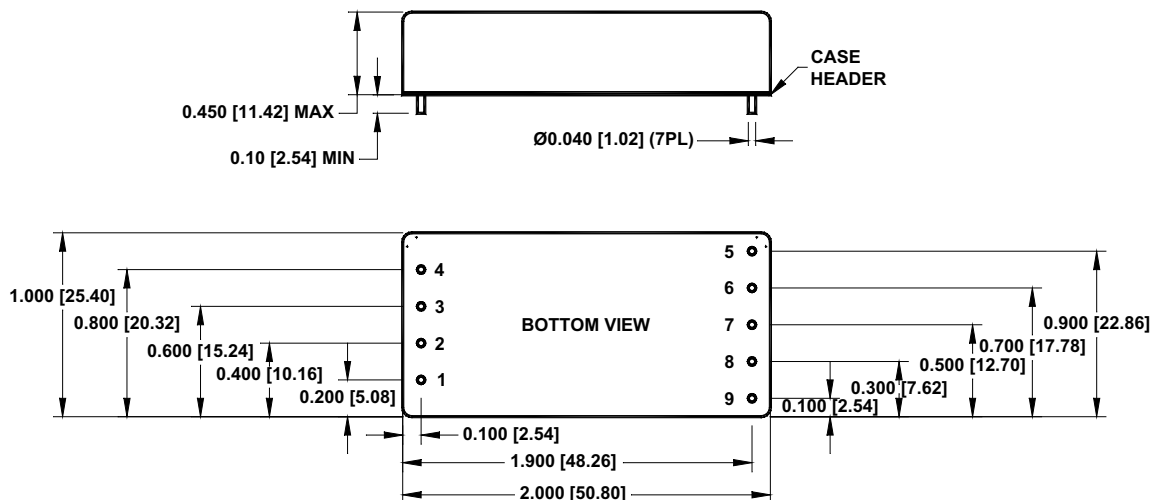


FIGURE 5. SYNC of multiple devices of Q25017

MECHANICAL SPECIFICATIONS



Pin	Function
DUAL	
INPUT	
1	ON/OFF
2	SYNC IN
3	-V _{IN}
4	+V _{IN}
OUTPUT	
5	V _{ADJ}
6	No Pin
7	+V _{OUT}
8	Common
9	-V _{OUT}

DIMENSIONS ARE IN INCH(mm)
TOLERANCE: XX ± 0.02 (5.08)
XXX ± 0.1 (2.54)