

100V 1A Non-Synchronous High Efficiency Buck Converter

1 FEATURES

- Wide Input Range: 6.5V-100V
- Constant On-Time Control Mode
- 1A Continuous Output Current
- Pulse Skipping Mode (PSM) at Light Load
- 70uA Quiescent Current
- Integrated 1000mΩ High-Side Power MOSFETs
- 0.766V±2% Feedback Reference Voltage
- 300kHz Switching Frequency
- 2ms Internal Soft-start Time
- Protections with Input UVLO, OT, OCP, OVP and UVP
- Hiccup Protection for Output Hard-short
- Available in a TSOT23-6L Package

2 APPLICATIONS

- Motor Drivers and Industrial Switcher
- BMS (E-Bike, Electric Tools)
- POE and Drones
- General Purpose Wide Vin Regulation

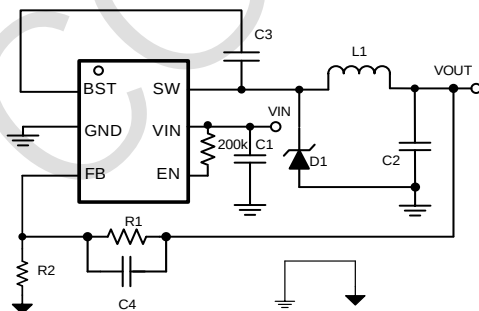
3 ORDERING INFORMATION

TYPE	MARKING	PACKAGE
QM1001A16	1A16	TSOT23-6L

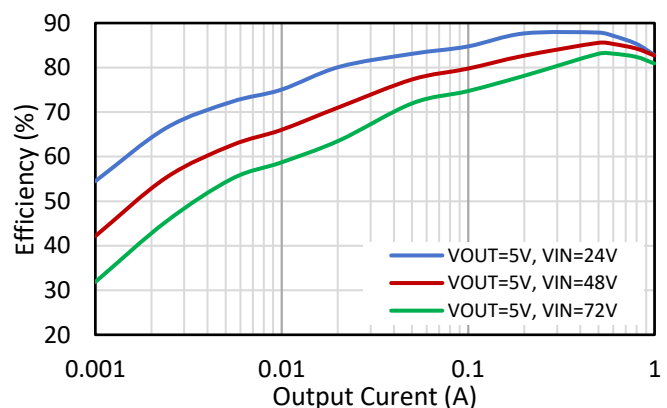
4 DISCRIPTION

The 1001A16 is a 6.5V-100V input, 1A output non-synchronous buck converter. A constant on-time (COT) control architecture provides excellent load and line transient response. The quiescent current of this device is 70uA in sleep mode and the shutdown current is 6uA, making it suitable for battery-powered system. Additional features of the 1001A16 include PSM mode operation to achieve high light-load efficiency, precision enable and input UVLO, cycle-by-cycle overcurrent protections, hiccup protection when output hard-short, and thermal shutdown protection with automatic recovery. The 1001A16 is available in a 6-pin TSOT23 package.

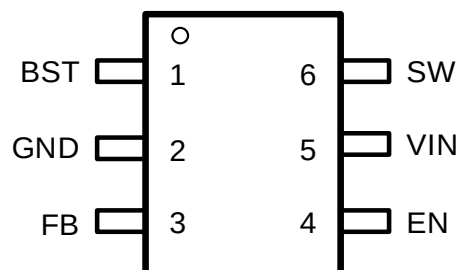
5 TYPICAL APPLICATIONS



Simplified Schematic



6 PIN CONFIGURATION AND FUNCTIONS



Top View: TSOT23-6L

PIN OUT		I/O	PIN FUNCTION
NAME	SOT23-6 NO.		
BST	1	I	Power supply for the high-side power MOSFET gate driver. Must connect a 0.1uF or greater ceramic capacitor between BST pin and SW node.
GND	2	G	Power ground.
FB	3	I	Buck converter output feedback sensing voltage. Connect a resistor divider from VOUT to FB to set up output voltage. The device regulates FB to the internal reference of 0.766V typically.
EN	4	I	Enable logic input. Floating the pin enables the device. It is recommended to connect to VIN by a 200kohm pullup resistor to enable the device or connect to an external EN input signal. The device has precision enable thresholds 1.25V rising / 1.05V falling for programmable UVLO threshold and hysteresis.
VIN	5	I	Power supply input. Must be locally bypassed.
SW	6	O	Switching node of the buck converter.

7 SPECIFICATIONS

7.1 Absolute Maximum Ratings

Over operating free-air temperature unless otherwise noted

DESCRIPTION	PARAMETER	MIN	MAX	UNIT
Input voltage	VIN to GND	-0.3	105	V
	FB, EN to GND	-0.3	6.5	
Max Input current to EN pin	I _{EN}		100 ⁽¹⁾	uA
Output voltage	BST to GND	-0.3	111	V
	BST to SW	-0.3	6	
	SW to GND	-1.5	105	
	SW to GND (20-ns transient)	-3	106	
Operating junction temperature, T _J		-40	150	°C
Storage temperature, T _{stg}		-65	150	°C

Note 1: For details on EN' s ABS max rating, please refer to the Enable/UVLO section.

7.2 ESD Ratings

PARAMETER	DEFINITION	MIN	MAX	UNIT
V _{ESD}	Human Body Model (HBM), per ANSI-JEDEC-JS-001-2014 specification, all pins ⁽¹⁾		±1500	V
	Charged Device Model (CDM), per ANSI-JEDEC-JS-002-2014 specification, all pins ⁽¹⁾		±1000	V

(1) HBM and CDM stressing are done in accordance with the ANSI/ESDA/JEDEC JS-001/002-2014 specification

7.3 Recommended Operating Conditions

Over operating free-air temperature range unless otherwise noted

PARAMETER	DEFINITION	MIN	NOM	MAX	UNIT
V _{IN}	Input voltage	6.5		100	V
V _{OUT}	Output voltage			V _{IN} -4.5	V
V _{SW}	Switch node voltage			100	V
I _{EN}	Max Input current to EN pin			100	uA
I _{LOAD}	Load current			1	A
T _J	Operating junction temperature	-40		125	°C

7.4 Thermal Information

PARAMETER	THERMAL METRIC	TSOT23-6L	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	102	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	37	°C/W

7.5 Electrical Characteristics

$V_{IN}=48V$, $T_J=-40^{\circ}C\sim 125^{\circ}C$, typical values are tested under $25^{\circ}C$.

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
Power Supply And Supply Current						
V_{IN}	Operating input voltage		6.5		100	V
V_{IN_UVLO}	Input UVLO	V_{IN} rising		5.8	6.4	V
	Hysteresis			500		mV
I_{SD}	VIN shutdown current	$V_{EN} = 0\text{ V}$		6	12.8	μA
I_Q	VIN quiescent current	$V_{FB} = 1.5\text{ V}$, $V_{BST}=6.5V$, $V_{EN} = 3\text{ V}$		70	96	μA
Power MOSFETS						
$R_{DS(on)-HS}$	High-side MOSFET $R_{DS(on)}$	$I_{SW} = -100\text{ mA}$		1000	1800	m Ω
EN						
$V_{EN-RISING}$	Buck enable threshold	$V_{EN/UVLO}$ rising	1.18	1.25	1.32	V
$V_{EN-FALLING}$	Buck enable threshold	$V_{EN/UVLO}$ falling	0.99	1.05	1.12	V
$I_{EN-pullup}$	EN pull-up current	$V_{EN} = 0\text{ V}$		0.3		μA
		$V_{EN} = 1.5\text{ V}$		2.3		μA
$V_{EN-CLAMP}$	EN clamp voltage	EN voltage at 100 μA current		5.8		V
Feedback and Current Limits						
V_{REF}	FB regulation voltage	V_{FB} falling	0.751	0.766	0.781	V
I_{LIM_HSD}	HSD switch current limit			1.4		A
Soft Start and Switching Frequency						
T_{SS}	Soft-start time	10% to 90% output		2		ms
F_{SW}	Switching Frequency		255	300	345	kHz
Bootstrap and Timing						
$V_{BST-UVLO}$	Gate drive UVLO	V_{BST} rising		3.6		V
		Hysteresis		0.6		V
T_{OFF_MIN}	Minimum off-time			260	320	ns

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
T _{ON_MIN} *	Minimum on-time			180		ns
Protections						
V _{OVP_H}	Output over voltage protection rising		121	125	129	%
V _{OVP_L}	Output over voltage protection falling		111	115	119	%
V _{UVP_H}	Output under voltage protection rising		47	50	56	%
V _{UVP_L}	Output under voltage protection falling		36	40	44	%
T _{SD}	Thermal shutdown threshold			165		°C
	Hysteresis			35		°C

* Guaranteed by design