

## 4-60V 800mA Non-Synchronous Step-Down DCDC Converter With High Efficiency Sleep Mode

### 1 FEATURES

- Wide Input Range: 4V-60V
- Up to 800mA Continuous Output Current
- 0.765V  $\pm$  2.5% Feedback Reference Voltage
- Integrated 600m $\Omega$  High-Side Power MOSFET
- Fixed Frequency 620kHz
- Pulse Skipping Mode (PSM) at Light Load
- 100ns Minimum On-time
- 5ms Internal Soft-start Time
- Over-Temperature Protection
- Available in an TSOT-6L Package

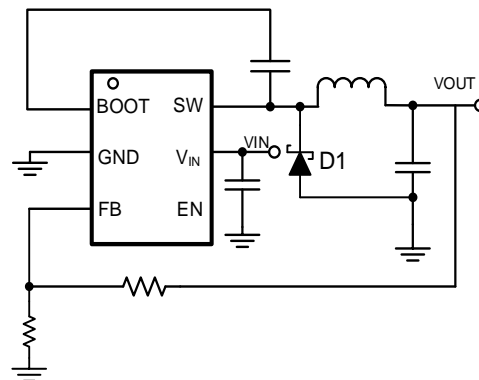
### 2 APPLICATIONS

- Industrial Distributed Power Bus
- Battery Powered Equipment
- Elevator, PLC, Servo
- Automatic Control
- Automotive

### 3 ORDERING INFORMATION

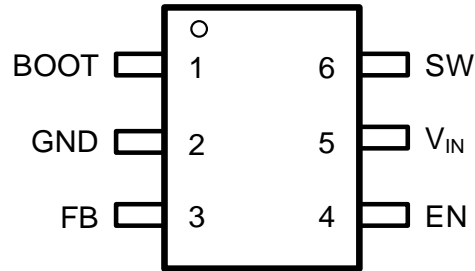
TYPE	MARKING	PACKAGE
GBI1600TKBR	1600	TSOT-6L

### 4 TYPICAL APPLICATIONS





## 5 PIN CONFIGURATION AND FUNCTIONS



Top View: GBI1600 TSOT-6L

PIN OUT		I/O	PIN FUNCTION
NAME	NO.		
BOOT	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 0.765V typically.
EN	4	I	Enable logic input. Floating the pin enables the device. This pin supports high voltage input up to VIN supply to be connected VIN directly to enable the device automatically. The device has precision enable thresholds 1.22V rising / 1.07V falling for programmable UVLO threshold and hysteresis.
V <sub>IN</sub>	5	I	Power supply input. Must be locally bypassed.
SW	6	O	Switching node of the buck converter.

## 6 SPECIFICATIONS

### 6.1 ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature unless otherwise noted

DESCRIPTION	PARAMETER	MIN	MAX	UNIT
Input Voltage	V <sub>IN</sub> , EN to GND	-0.3	65	V



	FB to GND	-0.3	6.5	V
	SS to GND	-0.3	6.5	V
	RT to GND	-0.3	6.5	V
	PGOOD to GND	-0.3	6.5	V
Output Voltage	SW to GND	-3	65	V
	BOOT to SW		6.5	V
Junction temperature	T <sub>J</sub>	-40	150	°C
Storage temperature	T <sub>STG</sub>	-65	150	°C

## 6.2 ESD RATINGS

PARAMETER	DEFINITION	MIN	MAX	UNIT
V <sub>ESD</sub>	Human Body Model (HBM), per ANSI-JEDEC-JS-001-2014 specification, all pins <sup>(1)</sup>		±2000	V
	Charged Device Model (CDM), per ANSI-JEDEC-JS-002-2014 specification, all pins <sup>(1)</sup>		±500	V

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

## 6.3 RECOMMENDED OPERATING CONDITIONS

Over operating free-air temperature range unless otherwise noted

PARAMETER	DEFINITION	MIN	MAX	UNIT
V <sub>IN</sub>	Supply voltage range	4.5	60	V
BOOT to SW		0	6	V
FB, PG		0	6	V
EN		0	60	V
f <sub>SW</sub>	Switching frequency range at RT mode	480	750	kHz
T <sub>J</sub>	Operating junction temperature	-40	125	°C

## 6.4 THERMAL INFORMATION

PARAMETER	THERMAL METRIC	TSOT23-6L	UNIT
R <sub>θJA</sub>	Junction to ambient thermal resistance	42.5	°C/W
R <sub>θJC_top</sub>	Junction to case (top) thermal resistance	56.1	°C/W
R <sub>θJC_bot</sub>	Junction to case (bottom) thermal resistance	3.8	°C/W
ψ <sub>JB</sub>	Junction to board characterization parameter	25.4	°C/W



## 6.5 ELECTRICAL CHARACTERISTICS

$V_{IN}=EN=4V\sim 60V$ ,  $T_J=-40^{\circ}C\sim 125^{\circ}C$ , typical values are tested under  $25^{\circ}C$ .

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>Power Supply</b>						
$V_{IN}$	Operating input voltage		4		60	V
$V_{IN\_UVLO}$	Input UVLO Hysteresis	$V_{IN}$ rising		3.65 120	3.8	V mV
$I_{SHDN}$	Shutdown current	$EN=0$ , No load, $4.5V\leq V_{IN}\leq 60V$		1	4	$\mu A$
$I_Q$	Quiescent current	$EN=floating$ , No load, No switch, $4.5V\leq V_{IN}\leq 60V$ , $BOOT-SW=5V$		80		$\mu A$
<b>Enable and Feedback</b>						
$V_{EN\_H}$	Enable high threshold			1.22		V
$V_{EN\_L}$	Enable low threshold			1.07		V
$V_{FB}$	Feedback Voltage			765		mV
<b>Power MOSFET</b>						
$R_{DSON\_H}$	High side FET on-resistance			600		m $\Omega$
<b>Switching Characteristics</b>						
$f_{SW}$	Switching frequency			620		KHz
$t_{ON\_MIN}$	Minimum on-time			100		ns
$D_{MAX}$	Maximum duty cycle	$f_{SW}=620kHz$		95		%
<b>Soft Start Time and Protection</b>						
$t_{SS}$	Internal soft-start time			5		ms
$I_{LIM\_HSD}$	HSD peak current limit	$V_{IN}=24V$		1.5		A
$T_{SD}$	Thermal shutdown threshold			170		$^{\circ}C$
	Hysteresis			30		
<b>Output Voltage Protection</b>						
$V_{OVP\_H}$	Output over voltage protection rising			109		%
$V_{OVP\_L}$	Output over voltage protection falling			105		%



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_{UVP\_L}$	Output under voltage protection falling			90		%
$V_{UVP\_H}$	Output under voltage protection rising			95		%

## 7 FUNCTION BLOCK DIAGRAM

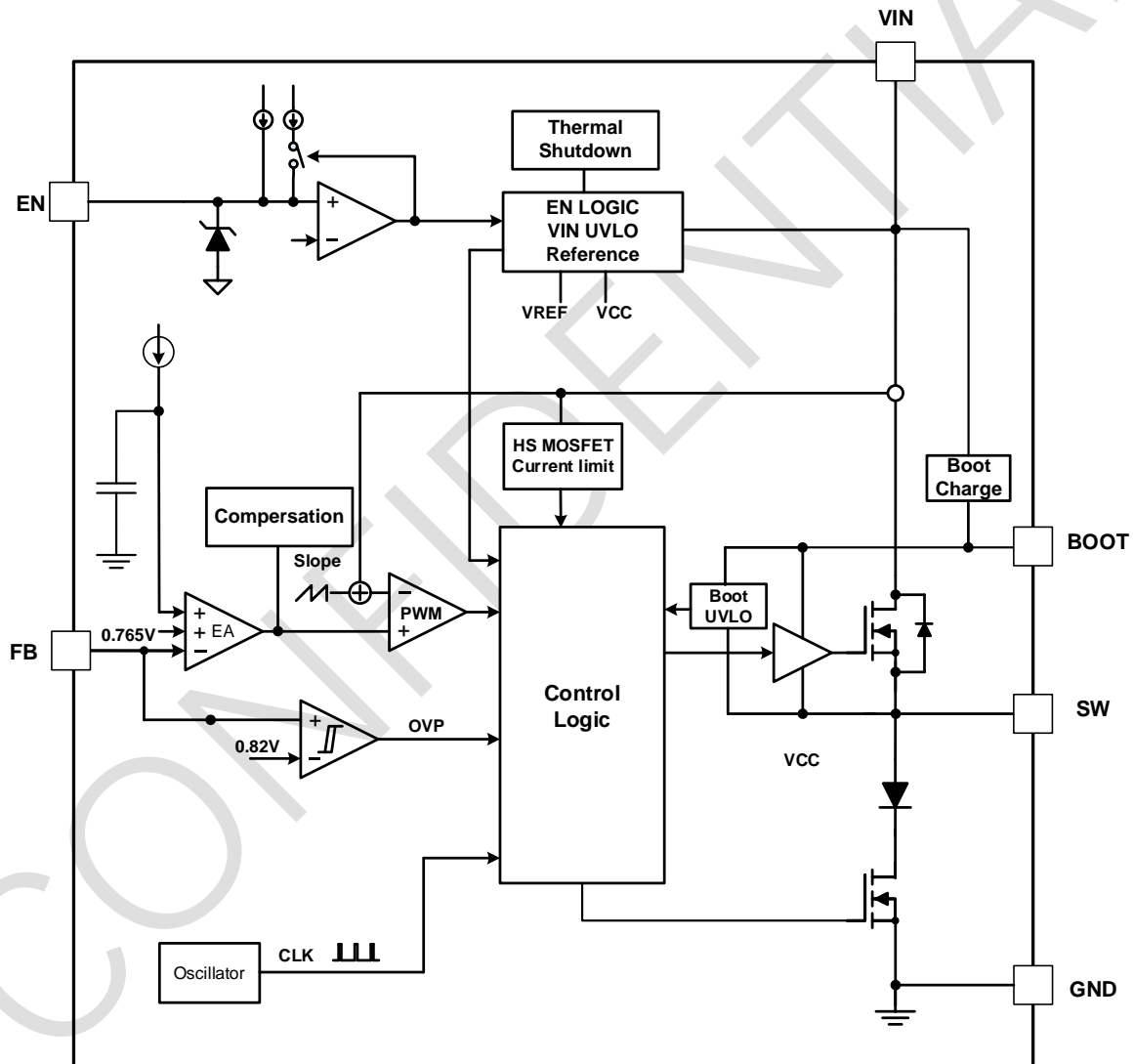


Figure 1 Block Diagram of GBI1600



**PACKAGE INFORMATION**

	<table border="1"> <thead> <tr> <th rowspan="2">Symbol</th> <th colspan="3">Millimeter</th> </tr> <tr> <th>Min</th> <th>Nor</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>-</td> <td>-</td> <td>0.95</td> </tr> <tr> <td>A1</td> <td>0</td> <td>-</td> <td>0.1</td> </tr> <tr> <td>A2</td> <td>0.75</td> <td>0.8</td> <td>0.85</td> </tr> <tr> <td>A3</td> <td>0.35</td> <td>0.4</td> <td>0.45</td> </tr> <tr> <td>b</td> <td>0.38</td> <td>-</td> <td>0.46</td> </tr> <tr> <td>b1</td> <td>0.37</td> <td>0.4</td> <td>0.43</td> </tr> <tr> <td>c</td> <td>0.13</td> <td>-</td> <td>0.17</td> </tr> <tr> <td>c1</td> <td>0.12</td> <td>0.13</td> <td>0.14</td> </tr> <tr> <td>D</td> <td>2.82</td> <td>2.92</td> <td>3.02</td> </tr> <tr> <td>E</td> <td>2.6</td> <td>2.8</td> <td>3.0</td> </tr> <tr> <td>E1</td> <td>1.5</td> <td>1.6</td> <td>1.7</td> </tr> <tr> <td>e</td> <td colspan="3">0.95BSC</td> </tr> <tr> <td>L</td> <td>0.3</td> <td>0.4</td> <td>0.5</td> </tr> <tr> <td><math>\theta</math></td> <td>0</td> <td>-</td> <td>8°</td> </tr> </tbody> </table>	Symbol	Millimeter			Min	Nor	Max	A	-	-	0.95	A1	0	-	0.1	A2	0.75	0.8	0.85	A3	0.35	0.4	0.45	b	0.38	-	0.46	b1	0.37	0.4	0.43	c	0.13	-	0.17	c1	0.12	0.13	0.14	D	2.82	2.92	3.02	E	2.6	2.8	3.0	E1	1.5	1.6	1.7	e	0.95BSC			L	0.3	0.4	0.5	$\theta$	0	-	8°
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