

High Efficiency Single Inductor Auto Buck-Boost Converter

Features

- 1.8V ~ 5.5V Input Voltage Operation
- Adjustable Output Voltage from 1.8V to 5.5V
- 95% Efficiency DC/DC Converter
- 1.5A Output Current at 3.3V for VIN > 3.6V
- Auto-Transition Between Buck and Boost Mode
- Pulse-Skipping Mode at light load for Efficiency
- DC/DC Converter can be set to lower quiescent current at light load
- Fixed 2.4MHz Frequency and Synchronization Possible
- Internal Soft-Start
- Built-In Cycle-by Cycle Current Limit and Over Voltage Protection
- Built-In Thermal Shutdown Function
- Power Good Function
- TDFN3X3-10 Package (0.5mm pitch)

General Description

The G2298 is a high efficiency single inductor Buck-Boost converter which can supply the load current up to 1.5A. It provides auto-transition between Buck and Boost Mode. The G2298 operates at 2.4MHz switching frequency in CCM. DC/DC converter operates at Pulse-Skipping Mode at light load. The output voltage is programmable using an external resistor divider, or is fixed to 3.3V internally. The load is disconnected from the VIN during shutdown.

The G2298 is available in TDFN3X3-10 package.

Applications

- Mobile Handsets
- Smart Phone

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G2298RE1U	2298	-40°C~+85°C	TDFN3X3-10

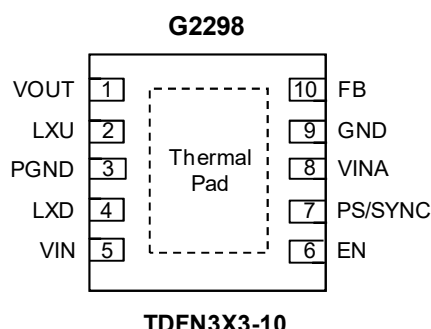
Note: RE: TDFN3X3-10

1: Bonding code

U: Tape & Reel

Green : Lead Free / Halogen Free.

Pin Configuration



Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

Absolute Maximum Ratings

VIN, VOUT, VINA	-0.3V to +6.5V
LXD, LXU	-0.3V to +6.5V
EN, PS/SYNC, FB	-0.3V to +6.5V
Thermal Resistance Junction to Ambient, (θ_{JA})	
TDFN3X3-10	TBD
Continuous Power Dissipation ($T_A=25^\circ\text{C}$)	
TDFN3X3-10	TBD

Thermal Resistance Junction to Case, (θ_{JC})	
TDFN3X3-10	TBD
Operating Ambient Temperature	-35°C to 85°C
Storage Temperature Range	-55°C to +150°C
Reflow Temperature (soldering, 10 sec)	260°C
EDS Susceptibility (Human Body Mode)	2kV
EDS Susceptibility (Machine Mode)	200V

- Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
- Device is ESD sensitive. Handling precaution recommended. The Human Body model is a 100pF capacitor discharged through a 1.5K Ω resistor into each pin.

Electrical characteristics

(VIN=VINA=3.6V, $T_A=25^\circ\text{C}$, unless otherwise specified)

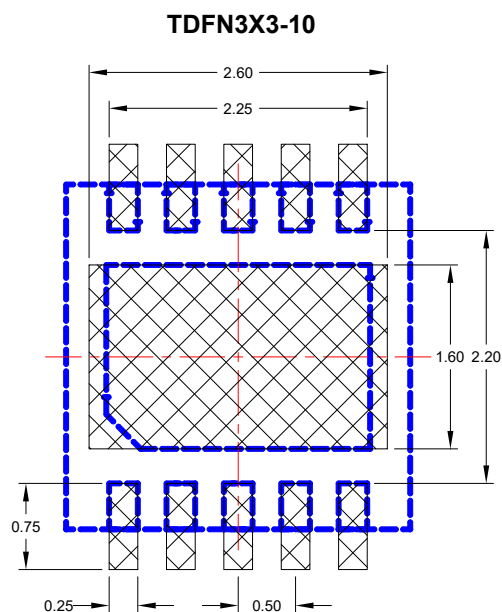
The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
GENERAL						
VIN minimum Startup Voltage	V _{IN,ST}		---	---	1.7	V
VIN Operating Voltage	V _{IN}		1.8	---	5.5	V
Output Voltage Range	V _{OUT}		1.8	---	5.5	V
Under Voltage Lockout Threshold	V _{UVLO,R}	V _{INA} voltage rising	---	1.7	---	V
	V _{UVLO,F}	V _{INA} voltage falling	---	1.6	---	V
Quiescent Current	I _Q	V _{EN} =V _{IN} =V _{INA} =3.6V, I _{OUT} =0A (No Switching)	---	55	80	μA
Shutdown Current	I _{SD}	V _{EN} =0V, V _{IN} =V _{INA} =3.6V	---	0.1	1	μA
OSCILLATOR						
Oscillator Frequency	F _{OSC}		2.2	2.4	2.6	MHz
Frequency range for Synchronization	F _{SYN}		4.4	4.8	5.2	MHz
DCDC Converter						
Soft-Start Internal	SS	V _{IN} =V _{INA} =3.6V	---	0.5	---	ms
Feedback voltage	V _{FB}	Adjustable Output	495	500	505	mV
Output voltage		Fixed 3.3V Output	3.267	3.3	3.333	V
Line Regulation	$\Delta V_{OUT,LINE}$	PWM	---	0.5	---	%
Load Regulation	$\Delta V_{OUT,LOAD}$	PWM	---	0.5	---	%
Maximum Duty Cycle	D _{MAX,D}	LXD	---	100	---	%
	D _{MAX,U}	LXU	90	93	96	%
FB Leakage Current	I _{FB,LK}	Adjustable Mode	---	---	1	μA
VOUT Leakage Current	I _{VO,LK}	V _{LXU} =0V, V _{OUT} =5V	---	1	5	μA
LXD, LXU Leakage Current	I _{LXD,LK} , I _{LXU,LK}	V _{LXD} =V _{LXU} =5V	---	1	5	μA
Switch ON Resistance	R _{ON,P}	V _{IN} =V _{INA} =3.6V	---	150	---	m Ω
	R _{ON,N}	V _{IN} =V _{INA} =3.6V	---	130	---	
Peak Current Limit	I _{LIM}	V _{IN} =V _{INA} =3.6V	---	2	---	A
Maximum Output Load Capability	I _{OD MAX}	V _{IN} $\geq$ 3.3V, V _O =3.3V	1.5	---	---	A
	I _{OU MAX}	V _{IN} =1.8V, V _O =3.3V	500	---	---	mA
Protection						
Over Voltage Protection Threshold	%V _{OVP}	Ratio=V _{OVP} /V _{OUT} , V _{OUT} voltage rising	---	120	---	%
Short Circuit Protection threshold	%V _{SCP}	Ratio=V _{SCP} /V _{OUT} , V _{OUT} voltage falling	---	20	---	%
Thermal Shutdown Protection	T _{SD}		---	150	---	°C
Thermal Shutdown Hysteresis	ΔT_{SD}		---	20	---	°C
Control Signal						
EN, PS/SYNC Input Voltage	V _{TH}	High Threshold	1.2	---	---	V
	V _{TL}	Low Threshold	---	---	0.4	V
EN, PS/SYNC Leakage Current	I _{EN,LK}	EN=V _{INA} or 0V	---	---	1	μA

Pin Description

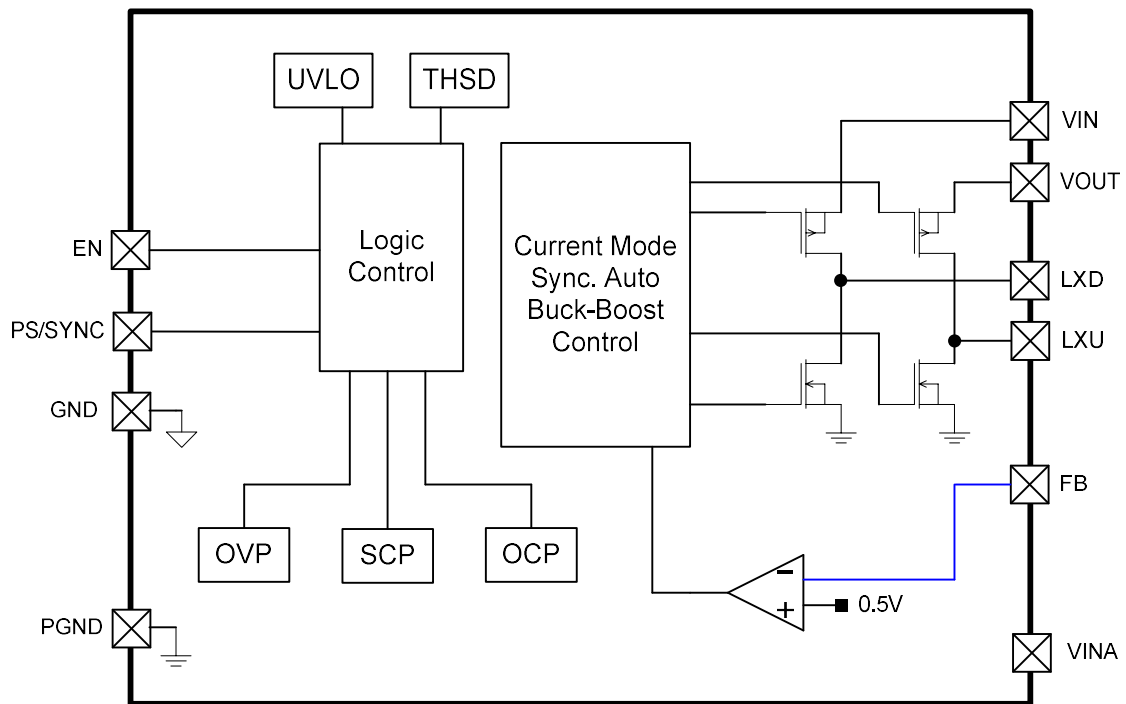
PIN	NAME	Function
1	VOUT	Power Output of Buck-Boost Converter
2	LXU	Inductor Switch Node
3	PGND	Power Ground of Buck-Boost Converter. The exposed pad must be soldered to a large PCB and connected to PGND for maximum power dissipation.
4	LXD	Inductor Switch Node
5	VIN	Power Input of Buck-Boost Converter
6	EN	Enable PIN (1 Enabled, 0 Disabled), must not be left open.
7	PS/SYNC	Enable/Disable Power Save Mode (1 Disabled, 0 Enabled, clock signal for synchronization), must not be left open.
8	VINA	IC Power Supply Input
9	GND	Chip Analog Ground
10	FB	Voltage Feedback of adjustable version, and connected to VOUT on fixed output voltage version.

Minimum Footprint PCB Layout Section

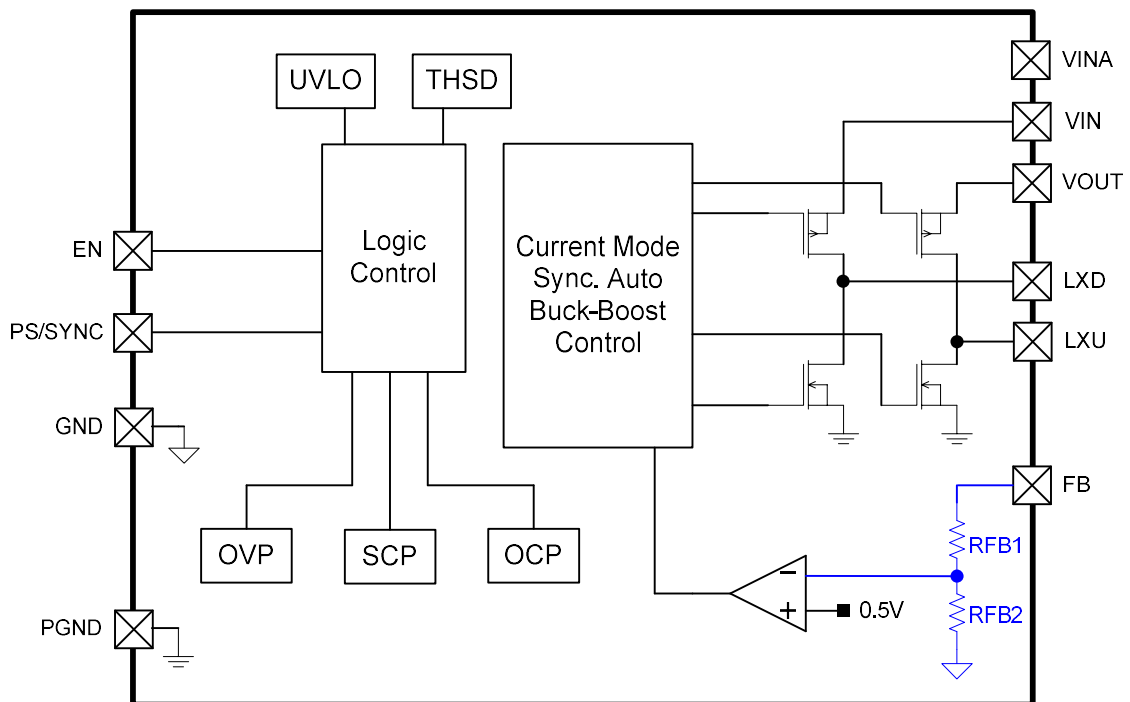


Block Diagram

Adjustable Output Voltage

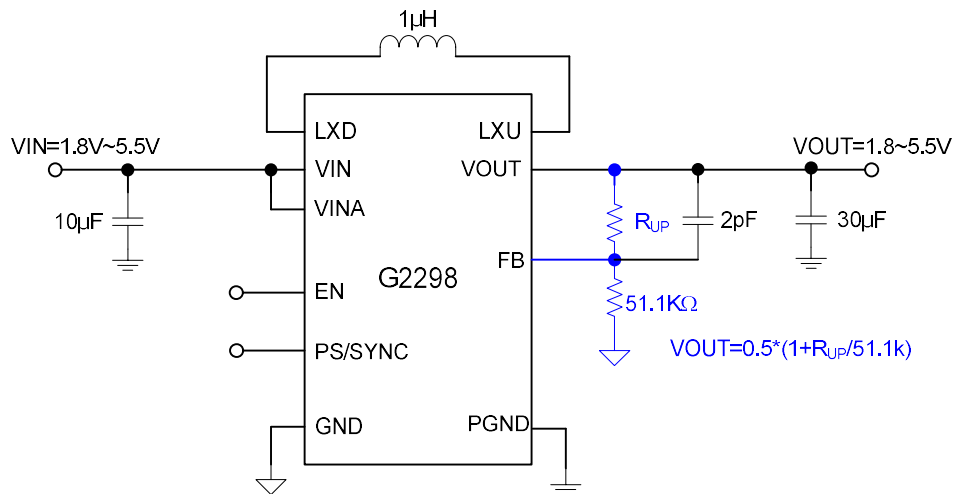


Fixed 3.3V Output Voltage

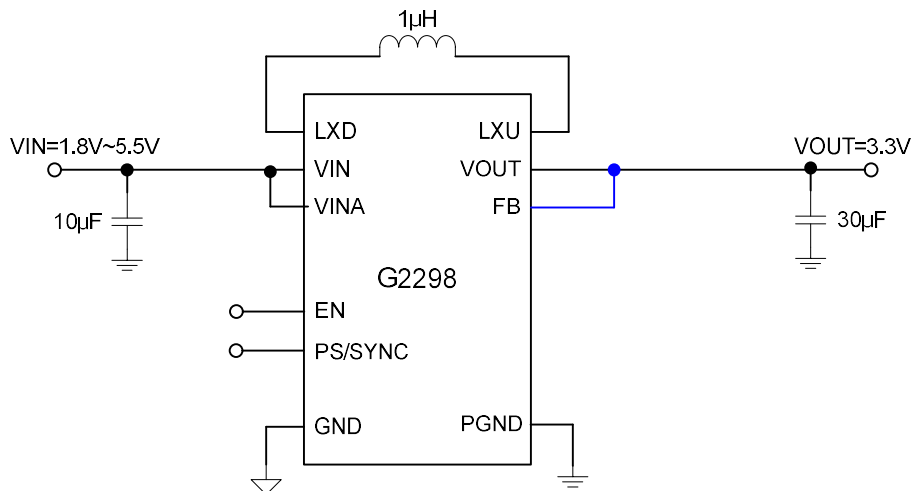


Application circuit

Adjustable Output Voltage



Fixed 3.3V Output Voltage



Function Description

The G2298 includes a DC/DC Converters.

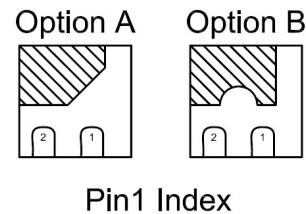
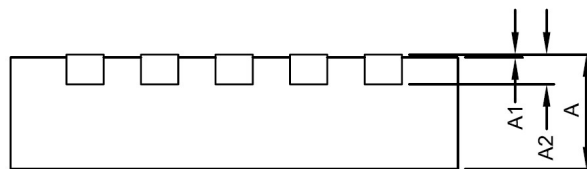
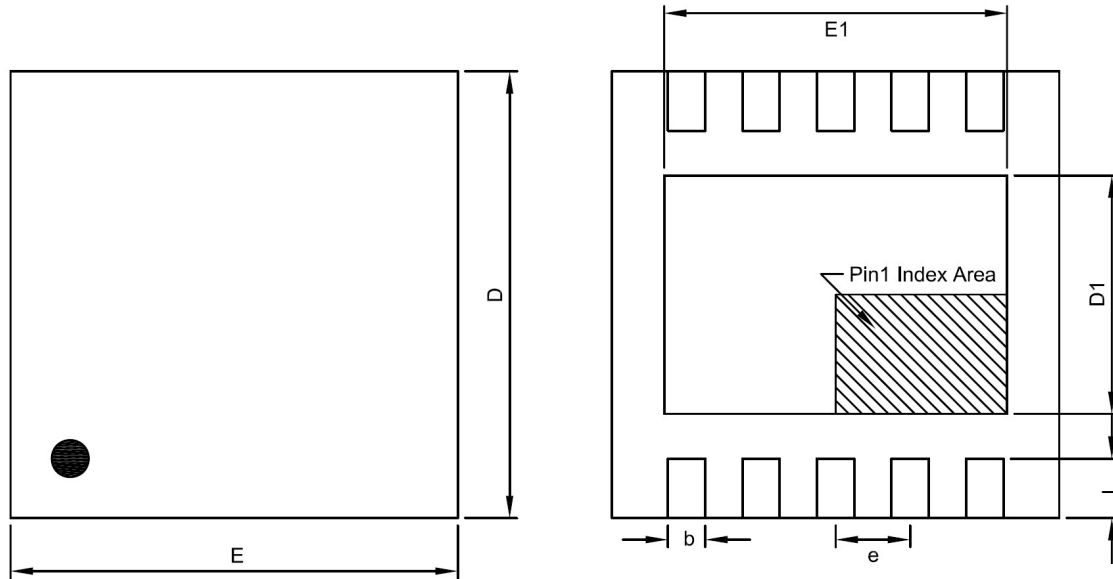
	Topology	Default V_{OUT}	V_{OUT} range	Current rating
DCDC	2.4MHz Sync. Auto Buck-Boost Converter	3.3V	Adjustable Mode: 1.8V to 5.5V Fixed Mode: 3.3V	1.5A

Fault Protection

G2298 provides VIN under-voltage lockout protection, over-current protection, VOUT over-voltage protection, VOUT short-circuit protection, and thermal shutdown protection to achieve complete protection.

	Protection Type	Threshold	Protection methods	Reset Method
VIN	UVLO	$VIN < 1.6V$	DCDC shutdown	$VIN > 1.7V$
DCDC Buck-Boost	Current Limit	Peak Inductor current $> 2A$	Buck Mode: PMOS Off, NMOS on Boost Mode: NMOS Off, PMOS on	Automatic Reset at next cycle
	OVP	$VOUT > 120\% * VOUT_{SET}$	DCDC1 stop switching	$VOUT < 110\% * VOUT_{SET}$
	SCP	$VOUT < 20\% * VOUT_{SET}$	Current Limit = 1A OSC Frequency = 1.2MHz	$VOUT > 30\% * VOUT_{SET}$
Thermal	TSD	Junction Temp. $> 150^{\circ}C$	DCDC shutdown	Junction Temp. $< 130^{\circ}C$

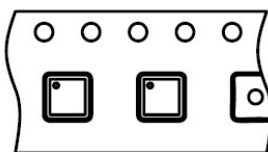
Package Information



TDFN3X3-10 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.05	0.0000	---	0.0020
A2	0.20 REF			0.0079 REF		
D	2.95	3.00	3.05	0.1161	0.1181	0.1201
E	2.95	3.00	3.05	0.1161	0.1181	0.1201
D1	1.50	1.60	1.75	0.0591	0.0630	0.0689
E1	2.20	2.60	2.70	0.0866	0.1024	0.1063
b	0.18	0.25	0.30	0.0071	0.0098	0.0118
e	0.50 BSC			0.0197 BSC		
L	0.30	0.40	0.50	0.0118	0.0157	0.0197

Taping Specification



Feed Direction

PACKAGE	Q'TY/REEL
TDFN3X3-10	3,000 ea

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