Low Start-up, 1.2A Boost Converter

Features

- **90% Efficiency**
- **0.9V Low Start-up Input Voltage**
- **Deliver 3.3V at 100mA from Single Cell Alkaline**
- **600kHz Switching Frequency**
- **17μA No Switching Quiescent Current**
- **Typical 40μA No Load Input Current at 3.3V Output**
- **Internal 0.3Ω n-Channel MOSFET**
- **Optional External n-Channel MOSFET Capability**
- **Small SOT-23-6 and TSOT-23-6 Package**

Applications

- **PDAs**
- **MP3 Players**
- **Digital Cameras**
- **Portable Devices**
- **Wireless Handsets**

General Description

The G5132 is a compact, high efficiency, switch embedded, low voltage step-up converter. It features a current mode control for fast transient response without additional compensations. The low start-up input voltage makes it suitable for 1 to 4 cells battery applications. At 600kHz switching frequency, small external components can be used to minimize the PCB size. It also keeps very low quiescent current at no switching period optimizing battery life. An external n-channel MOSFET switch can be added for larger output power requirement.

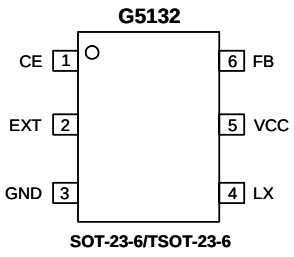
The G5132 is available in a SOT-23-6 or TSOT-23-6.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Pb free)
G5132TB1U	5132x	-40°C to 85°C	SOT-23-6
G5132TP1U	5132x	-40°C to 85°C	TSOT-23-6

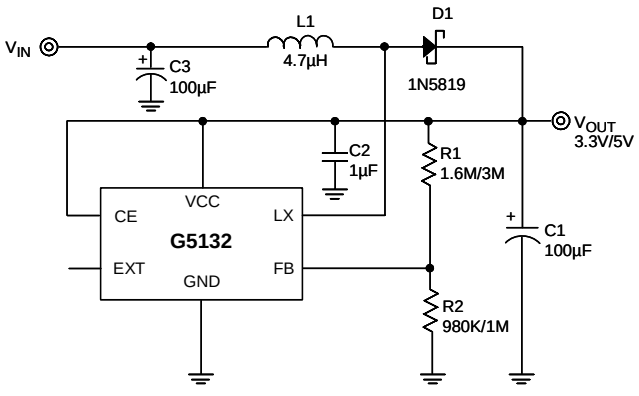
Note:TB : SOT23-6 TP : TSOT23-6
1: Bonding Code
U: Tape & Reel

Pin Configuration



SOT-23-6/TSOT-23-6

Typical Application Circuit



$$V_{OUT} = 1.25 \times (1 + \frac{R1}{R2})$$

Absolute Maximum Ratings

VCC, LX to GND. . . . . -0.3V to +7.0V
FB, CE, EXT to GND. . . . . -0.3V to VCC+0.3V
Operating Temperature Range. . . . . -40°C to 85°C
Junction Temperature. . . . . .150°C

Thermal Resistance Junction to Ambient, (θ_{JA})
SOT-23-6. . . . . .240°C/W
Storage Temperature. . . . . -65°C to 150°C
Reflow Temperature (soldering, 10sec) . . . .260°C

Stress beyond those listed under "Absolute Maximum Rating" may cause permanent damage to the device.

Electrical Characteristics

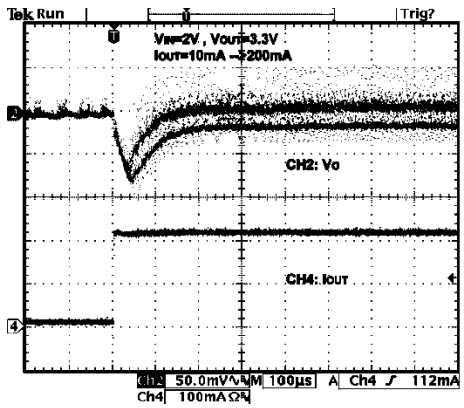
V_{CC} = V_{CE} = 3.3V, T_A = 25°C

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Start-up Input Voltage		---	0.85	1	V
Hold-on Voltage		0.6	---	---	V
Output Voltage Range		2.5	---	6	V
Input Current	no load (closed loop), I_{BAT}	---	40	---	µA
	Switching, I_{CC}	---	0.3	2	mA
	no switching, I_{CC}	8	17	34	µA
CE V_{IH}		1.2	---	---	V
CE V_{IL}		---	---	0.4	V
FB Feedback Voltage		1.23	1.25	1.27	V
Switching Frequency	V_{FB} = 0V	480	600	720	kHz
Maximum Duty		90	95	---	%
Minimum Duty		---	5	---	%
EXT ON Resistance to V_{CC}	V_{CC} = 3.3V	---	6	12	Ω
EXT ON Resistance to GND	V_{CC} = 3.3V	---	6	12	Ω
LX $R_{DS(ON)}$	I_{SW} = 150mA, V_{CC}=3.3V	---	0.3	0.5	Ω
LX Leakage Current	V_{SW} = 7V	---	0.1	10	µA
LX Current Limit		1.2	1.8	2.2	A
Thermal Shutdown		---	150	---	°C
Thermal Shutdown Hysterises		---	10	---	°C

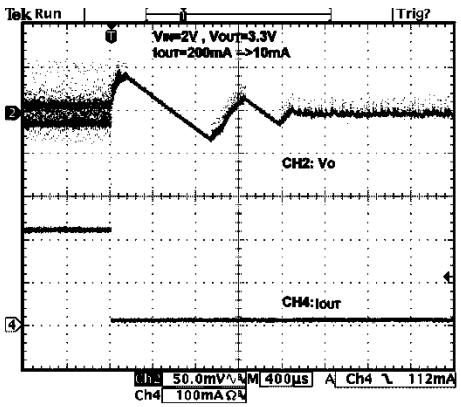
Typical Performance Characteristics

(T_A=25°C, unless otherwise noted)

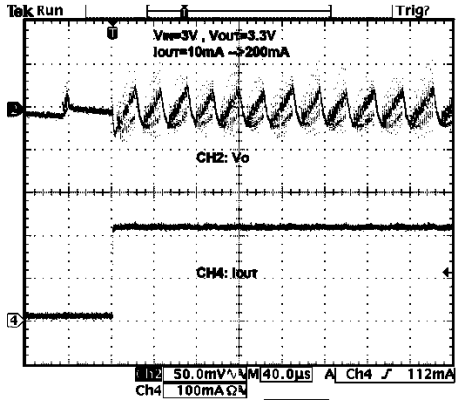
Transient Response



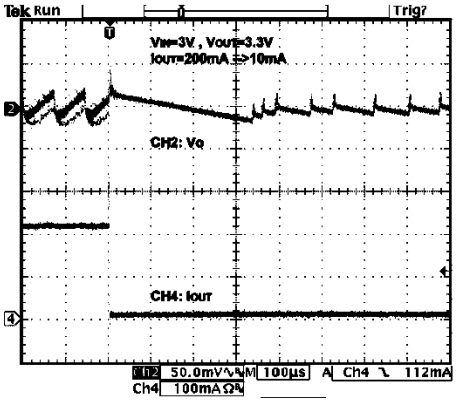
Transient Response



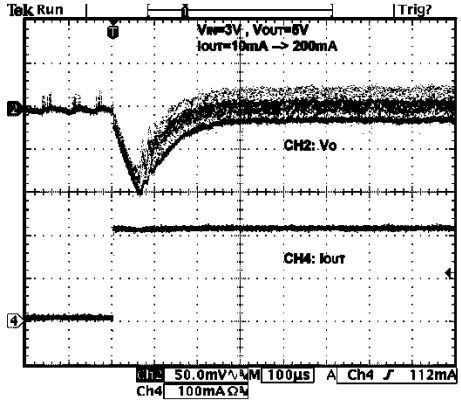
Transient Response



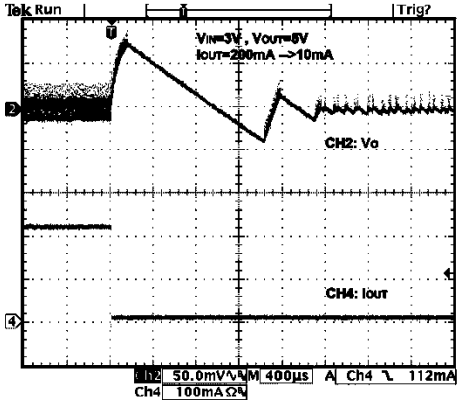
Transient Response



Transient Response

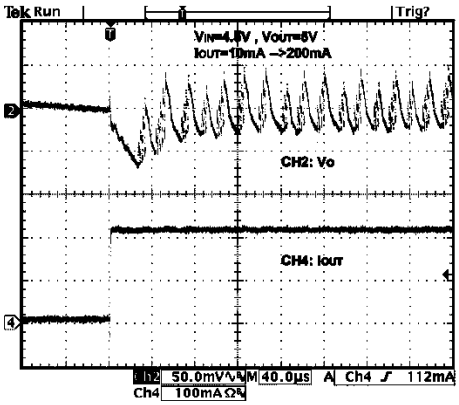


Transient Response

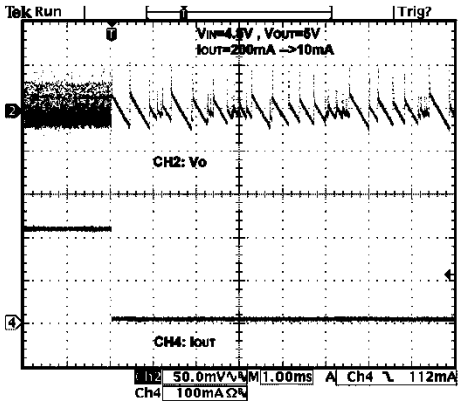


Typical Performance Characteristics (continued)

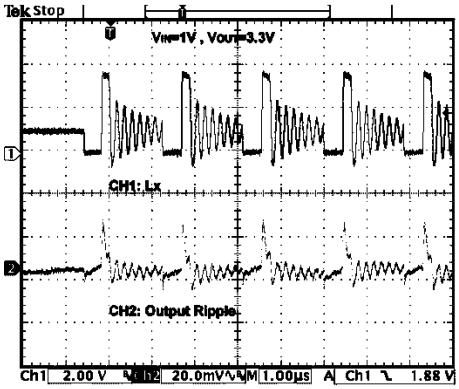
Transient Response



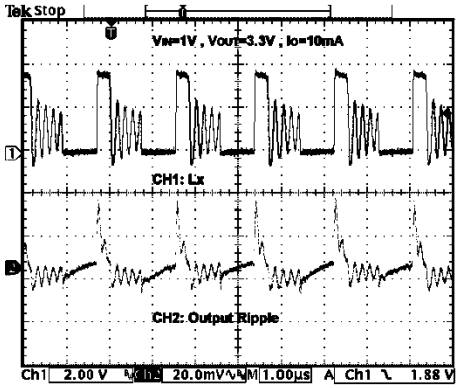
Transient Response



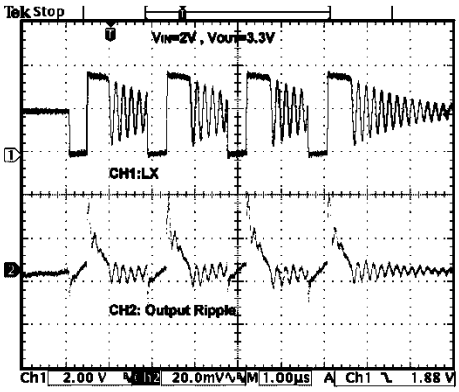
LX & Output Ripple



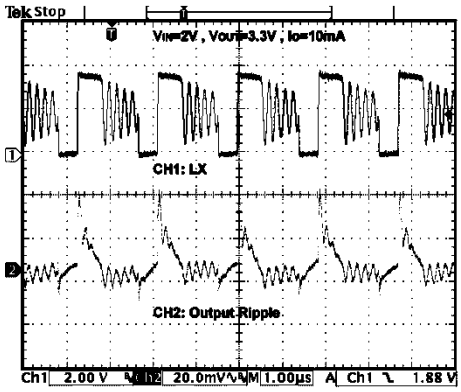
LX & Output Ripple



LX & Output Ripple

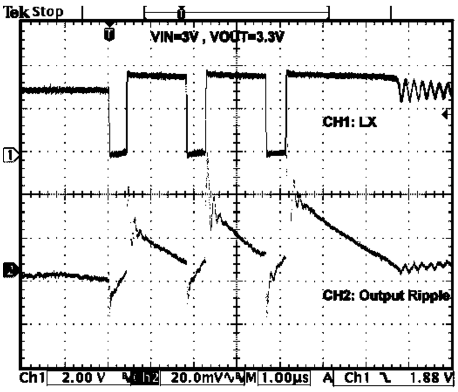


LX & Output Ripple

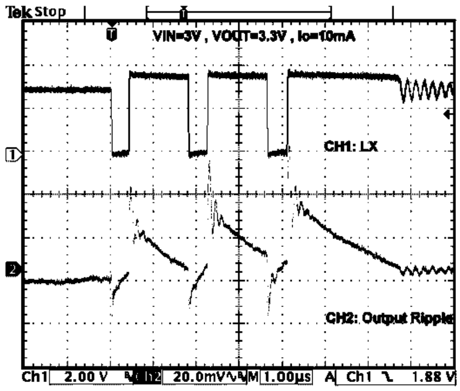


Typical Performance Characteristics (continued)

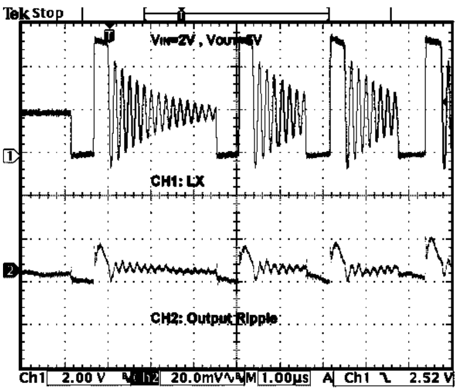
LX & Output Ripple



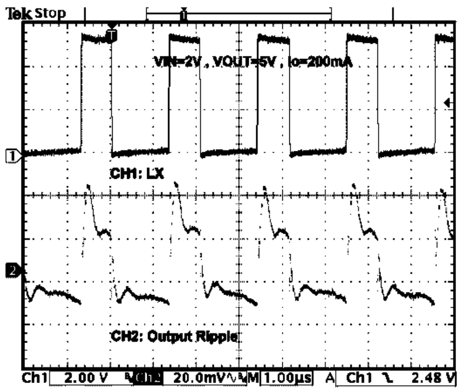
LX & Output Ripple



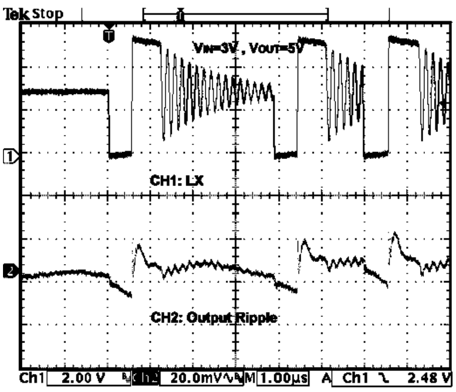
LX & Output Ripple



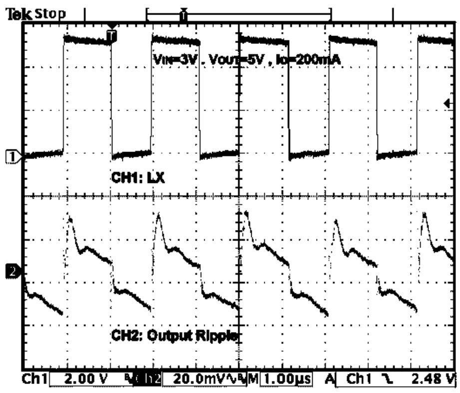
LX & Output Ripple



LX & Output Ripple

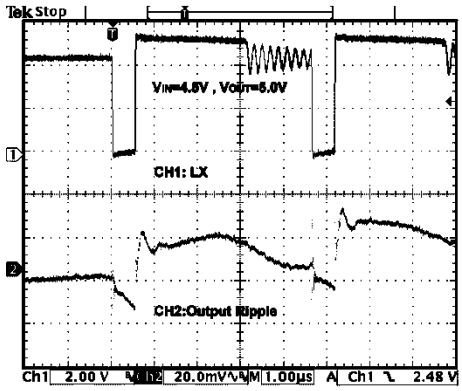


LX & Output Ripple

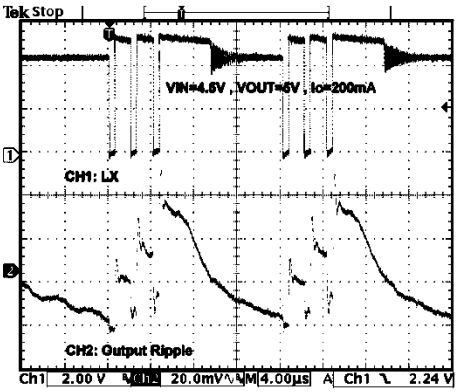


Typical Performance Characteristics (continued)

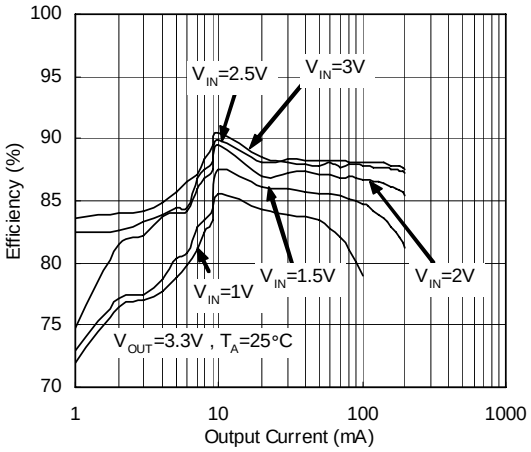
LX & Output Ripple



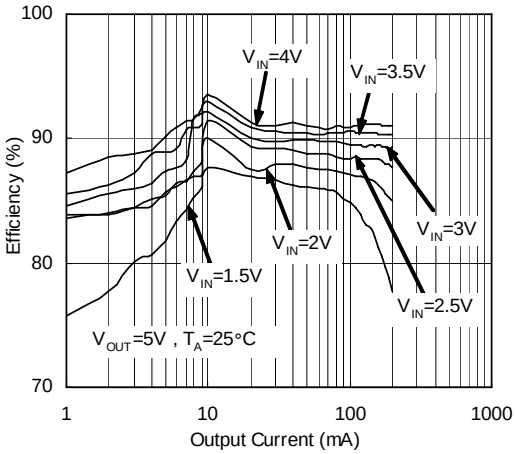
LX & Output Ripple



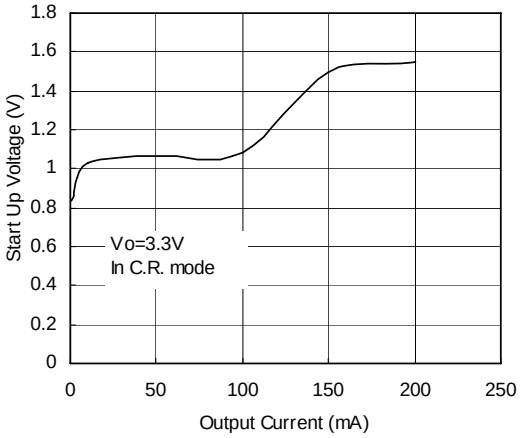
Efficiency vs. Output Current



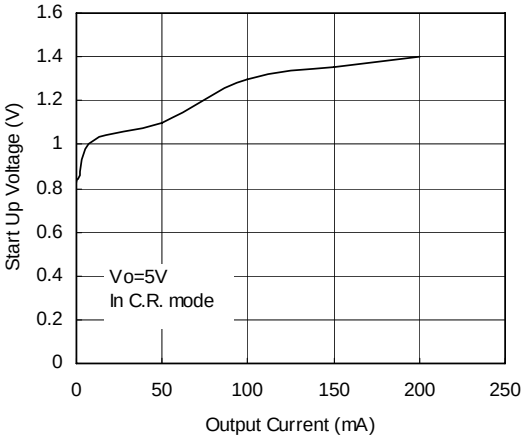
Efficiency vs. Output Current



Start Up Voltage vs. Output Current



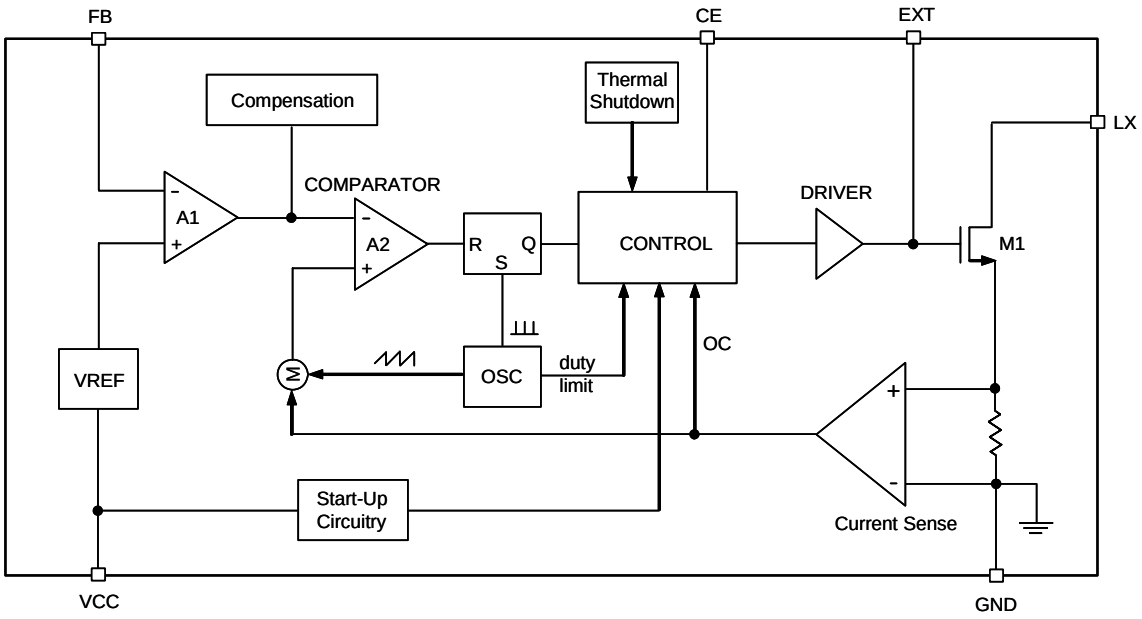
Start Up Voltage vs. Output Current



Pin Descriptions

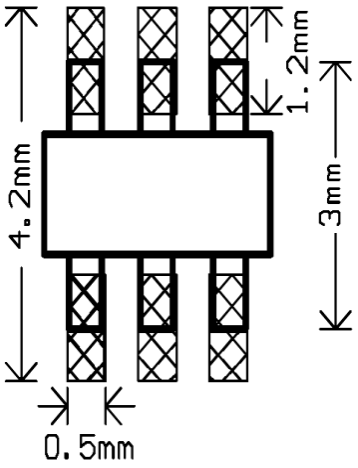
PIN SOT-23-6/TSOT-23-6	NAME	FUNCTION
1	CE	Chip Enable Pin.
2	EXT	External NMOS Drive Pin.
3	GND	Ground
4	LX	Switching Node. N-Channel MOSFET drain
5	VCC	Input Power Supply.
6	FB	Feedback Input Pin.

Block Diagram



Recommended Minimum Footprint

SOT-23-6/TSOT-23-6



Function Description

The G5132 will start up at a low V_{IN} voltage or higher. The low voltage start-up circuitry controls the internal NMOS switching frequency and duty before the V_{OUT} reaches 2V. Soft start begins from this operating mode. The inductor current is controlled to minimize the in-rush current during this period. Once V_{OUT} exceed 2V, the internal NMOS switch is controlled by error amplifier. Hence the output will goes to its nominal value.

Application Information

Inductor Selection

A 3.3µ~6.8µH inductor is recommended for small ripple applications. Small form factor and high efficiency are the major concerns for most G5132 applications. Inductor with low core losses and small DCR (cooper wire resistance) at 600kHz are good choice for G5132 applications.

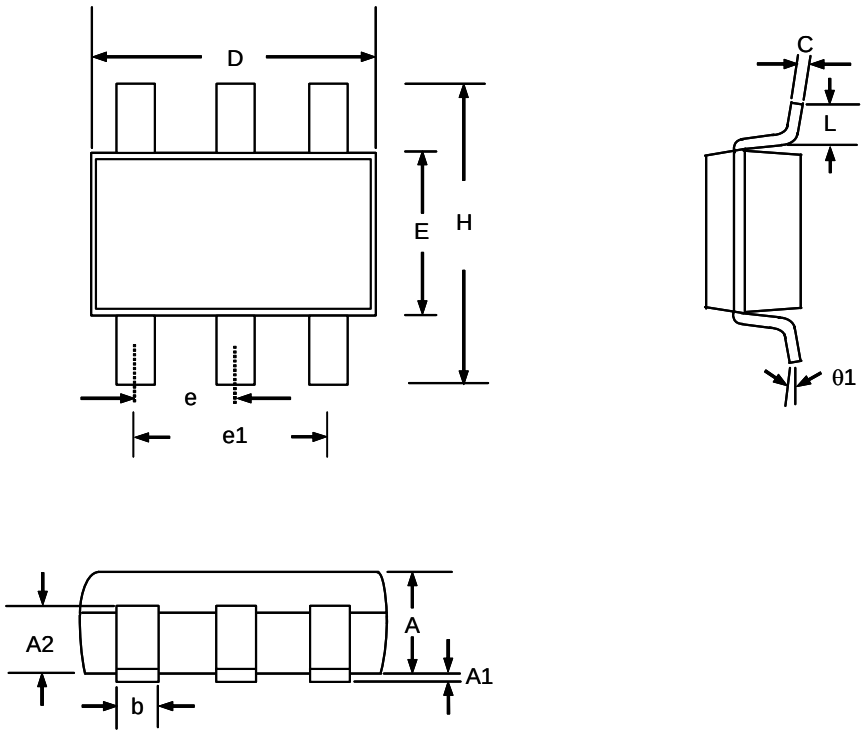
Capacitor Selection

To using a low cost Tantalum/Al type capacitor, a 68µF~220µF output capacitor is enough. Another small 1µF ceramic is recommended to place near G5132 VCC pin to bypass high frequency noise generated from the higher ESR main output capacitor.

Diode Selection

Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for G5132 applications. The forward voltage drop of a Schottky diode represents the conduction losses in the diode, while the diode capacitance (C_T or C_D) represents the switching losses. For diode selection, both forward voltage drop and diode capacitance need to be considered. Schottky diodes with higher current ratings usually have lower forward voltage drop and larger diode capacitance, which can cause significant switching losses at the 600kHz switching frequency of G5132. A Schottky diode rated at 1.5A is sufficient for most G5132 applications.

Package Information

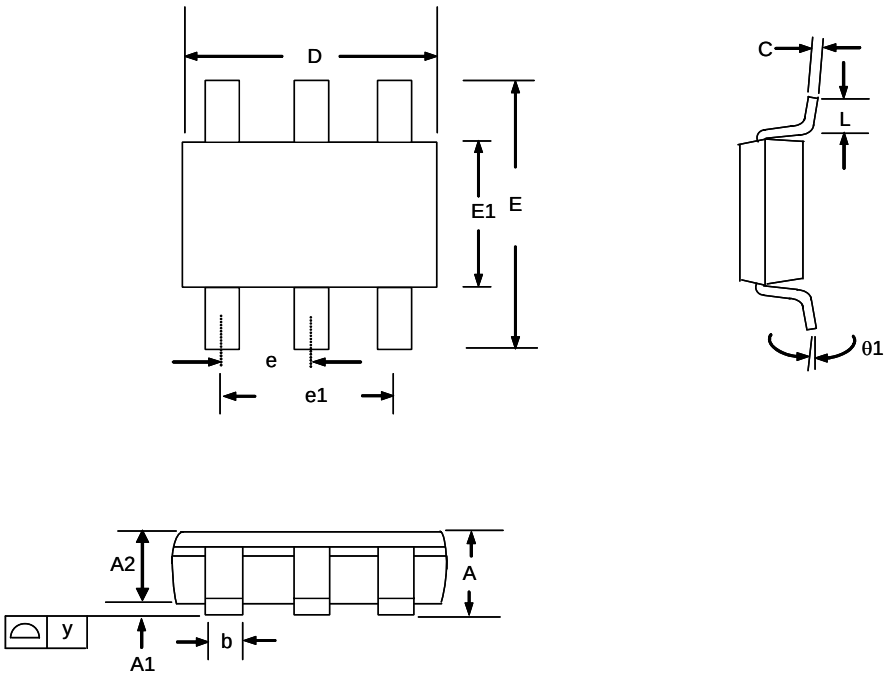


SOT-23-6 (TB) Package

Note:

1. Package body sizes exclude mold flash protrusions or gate burrs
2. Tolerance ±0.1000 mm (4mil) unless otherwise specified
3. Coplanarity: 0.1000mm
4. Dimension L is measured in gage plane

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.10	1.30	0.039	0.043	0.051
A1	0.00	-----	0.10	0.000	-----	0.004
A2	0.70	0.80	0.90	0.028	0.031	0.035
b	0.35	0.40	0.50	0.014	0.016	0.020
C	0.10	0.15	0.25	0.004	0.006	0.010
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.40	1.60	1.80	0.055	0.063	0.071
e	-----	0.95	-----	-----	0.037	-----
e1	-----	1.90 (TYP)	-----	-----	0.075 (TYP)	-----
H	2.60	2.80	3.00	0.102	0.110	0.118
L	0.37	------	-----	0.015	-----	-----
θ1	1°	5°	9°	1°	5°	9°



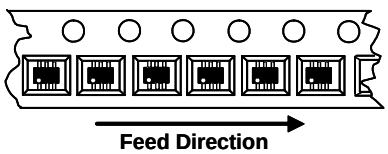
TSOT-23-6 (TP) Package

Note:

1. Dimension D does not include mold flash, protrusions or tate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.1mm PER end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15mm PER side.
2. The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.75	-----	1.00	0.030	-----	0.039
A1	0.00	-----	0.10	0.000	-----	0.004
A2	0.70	0.75	0.90	0.028	0.030	0.035
b	0.35	-----	0.51	0.014	-----	0.020
C	0.10	-----	0.25	0.004	-----	0.010
D	2.80	2.90	3.00	0.110	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
e		0.95 BSC			0.0374 BSC	
e1		1.90 BSC			0.0748 BSC	
L	0.37	-----	-----	0.015	-----	-----
y	-----	-----	0.10		-----	0.004
θ1	0°	-----	8°	0°	-----	8°

Taping Specification



Feed Direction

SOT- 23-6、TSOT-23-6 Package Orientation

PACKAGE	Q'TY/REEL
SOT-23-6	3,000 ea
TSOT-23-6	3,000 ea