600mA, 500kHz, Step-Down Switching Regulator in SOT-23

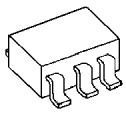
■ GENERAL DESCRIPTION

The NJW1616 is a switching regulator IC for buck converter that operates wide input voltage range from 4.5V to 20V. The wide input range makes the NJW1616 suitable for several applications such as 12V commodity supplies, and the other unregulated voltage sources.

It corresponds to Low ESR output capacitor (MLCC), high operating frequency of 500kHz, internally compensated and small SOT-23 package. Therefore, the NJW1616 can realize downsizing of applications with a few and tiny external parts so that adopts current mode control.

Also, it has a soft start function, over current protection and thermal shutdown circuit.

■ PACKAGE OUTLINE

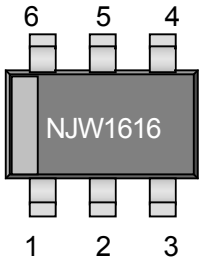


NJW1616F1

■ FEATURES

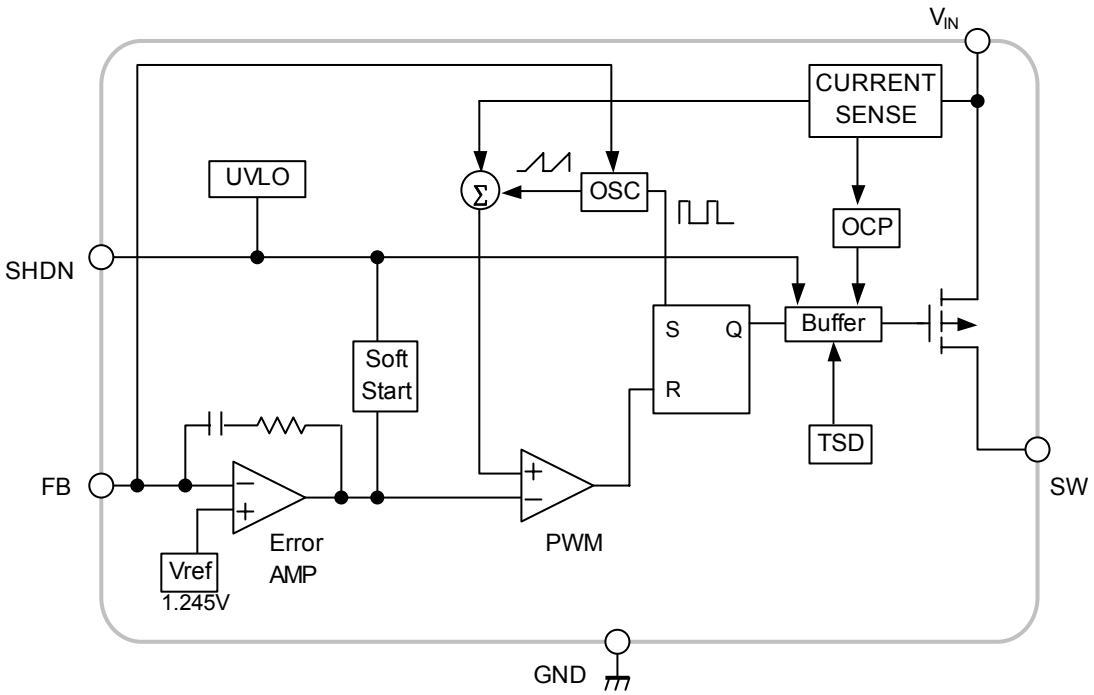
- Pin compatible with LT1616 and LT2736. Also it is possible to reduce an external part
- Maximum Rating Input Voltage: 25V
- Wide Operating Voltage Range: 4.5 V to 20V
- Switching Current: 0.8A (min.)
- Fixed Operating Frequency: 500kHz
- Uses Tiny Capacitors and Inductors
- Soft Start Function
- Low Shutdown Current $< 1\mu A$
- Internally Compensated
- Under Voltage Lockout (UVLO)
- Output Adjustable Down to 1.25V
- Over Current Protection / Thermal Shutdown Protection
- Package Outline: SOT-23-6-1

■ PIN CONFIGURATION



Pin Function
1. N.C.
2. GND
3. FB
4. SHDN
5. V_{IN}
6. SW

■ BLOCK DIAGRAM



■ **ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETER	SYNBOL	RATINGS	UNIT
Input Voltage	V_{IN}	–0.3 to +25	V
V^+-SW pin voltage	$V_{V\text{-}SW}$	–0.3 to +25	V
SHDN Voltage	V_{SHDN}	–0.3 to +25	V
Feedback Pin Voltage	V_{FB}	–0.3 to +6	V
Power Dissipation	P_D	510 (*1) 710 (*2)	mW
Junction Temperature	T_j	–40 to +150	°C
Operating Temperature	T_{opr}	–40 to +85	°C
Storage Temperature	T_{stg}	–50 to +150	°C

(*1): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 2Layers)

(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 4Layers),
internal Cu area: 74.2×74.2mm

■ **RECOMMENDED OPERATING CONDITION** (T_a=25ºC)

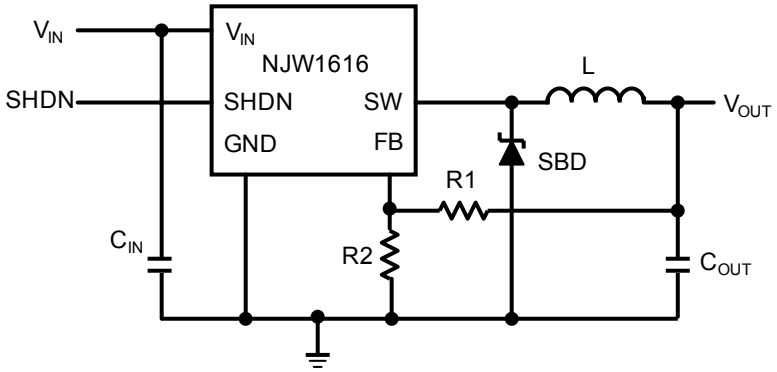
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	4.5	–	20	V

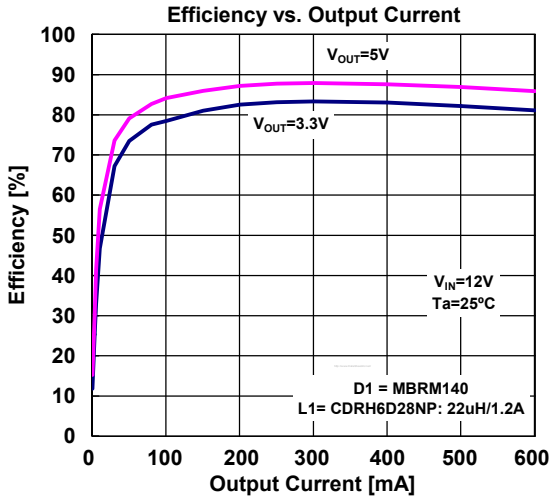
■ **ELECTRICAL CHARACTERISTICS**

(Specifications in standard type face are for Ta=+25°C and those with boldface type apply over the bellow Operating Temperature Range (Ta=–40°C to +105°C). Minimum and Maximum specs are guaranteed through test. Unless otherwise noted, V_{IN}=12V, Ta=+25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V_{T_ON}	V_{IN} = L → H	4.2	4.35	4.5	V
OFF Threshold Voltage	V_{T_OFF}	V_{IN} = H → L	4.1	4.25	4.4	V
Hysteresis Width	V_{HYS}		–	100	–	mV
Oscillation Block						
Oscillation Frequency1	f_{OSC1}	V_{FB}=1.1V	400	500	600	kHz
Oscillation Frequency2	f_{OSC2}	V_{FB}=0V	–	80	–	kHz
Error Amplifier Block						
Feedback Voltage	V_B		**–1.6%**	1.245	**+1.6%**	V
FB Pin Bias Current	I_B	V_{FB}=1.3V	–	10	**100**	nA
PWM Comparator Block						
Maximum Duty Cycle	$M_{AX}D_{UTY}$	V_{FB}=1.1V	**88**	94	–	%
Minimum ON Time	t_{ON_min}		–	100	160	ns
Output Block						
Switching Current Limit	I_{LIM}		0.8	1.1	1.5	A
Output ON Resistance	R_{ON}	I_{SW}=400mA	–	1	1.6	Ω
Switch Leakage Current	I_{LEAK}	V_{SHDN} = 0V, V_{IN}=25V, V_{SW}=0V	–	–	1	μA
SHDN Block						
SHDN ON Control Voltage	$V_{SHDN(ON)}$		2.3	–	–	V
SHDN OFF Control Voltage	$V_{SHDN(OFF)}$		–	–	0.3	V
SHDN Bias Current1	I_{SHDN_BIAS1}	V_{SHDN} = 2.3V	–	5	10	μA
SHDN Bias Current2	I_{SHDN_BIAS2}	V_{SHDN} = 0V	–	0.01	0.1	μA
General						
Quiescent Curent1	I_{DD1}	Not Switching, V_{FB}=1.3V	–	1.6	2.5	mA
Quiescent Current2	I_{DD2}	No Load, V_{FB}=1.1V	–	2.2	3.2	mA
Quiescent Current in SHDN	I_{DD_SHDN}	V_{SHDN} = 0V	–	–	1	μA

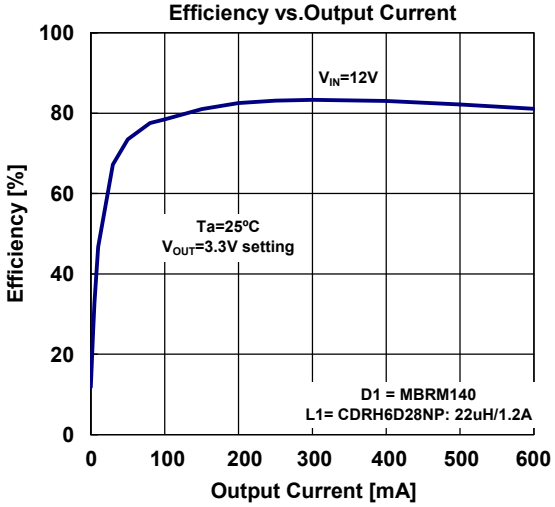
■ TYPICAL APPLICATIONS



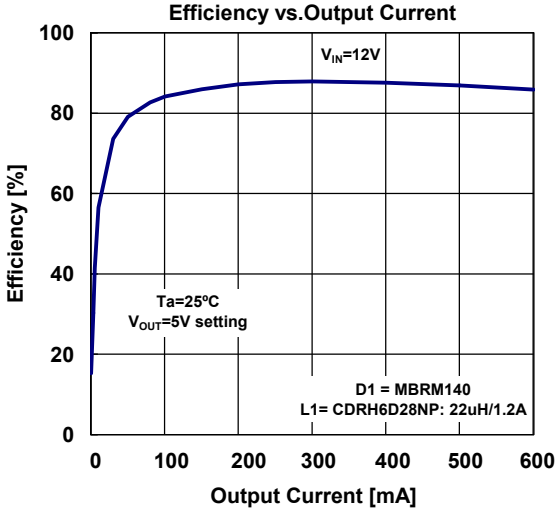


■ TYPICAL CHARACTERISTICS

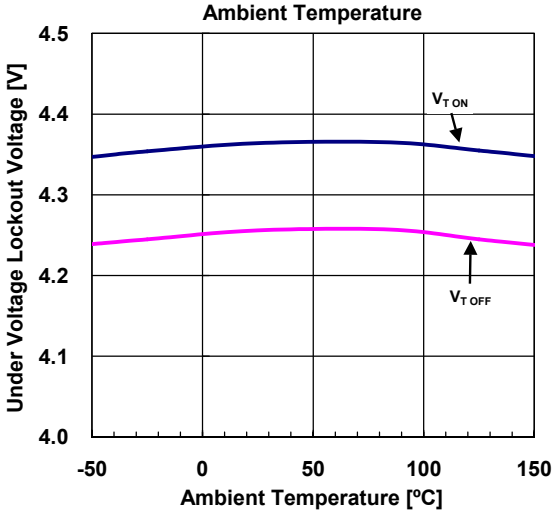
Efficiency vs.Output Current



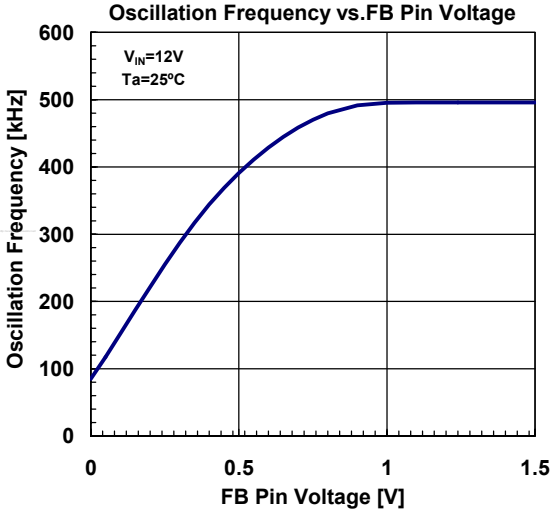
Efficiency vs.Output Current



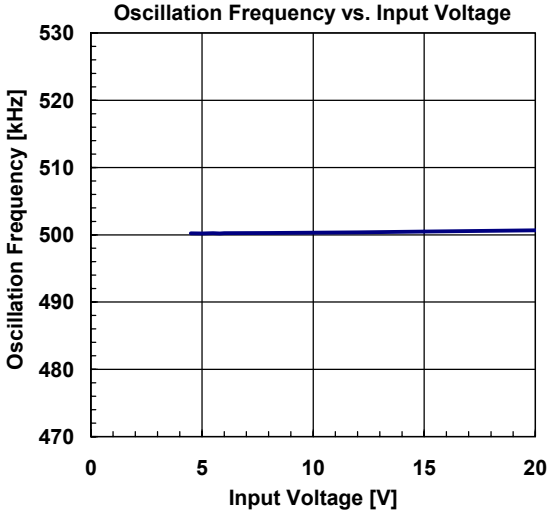
Under Voltage Lockout Voltage vs. Ambient Temperature



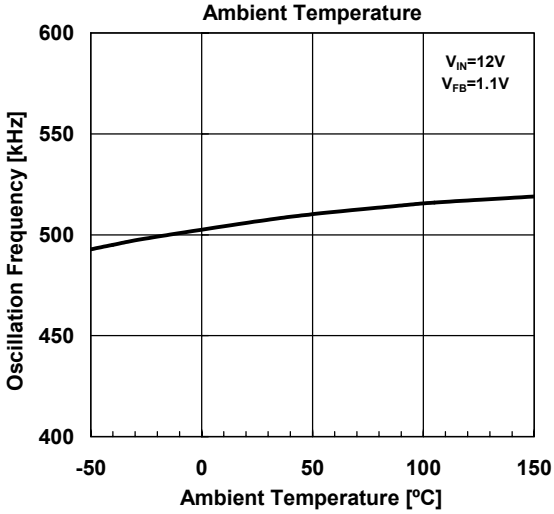
Oscillation Frequency vs.FB Pin Voltage



Oscillation Frequency vs. Input Voltage

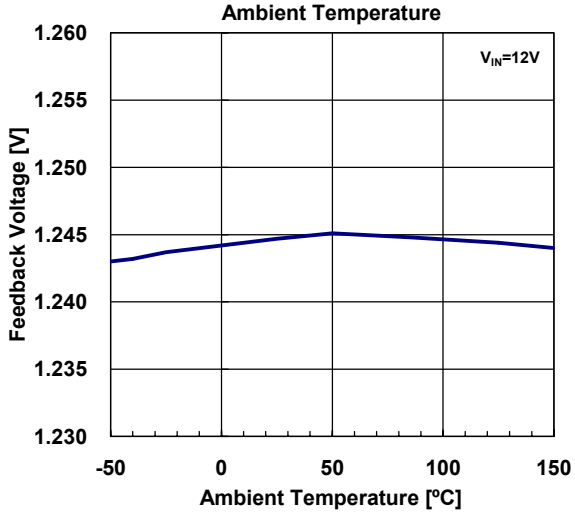


Oscillation Frequency vs. Ambient Temperature

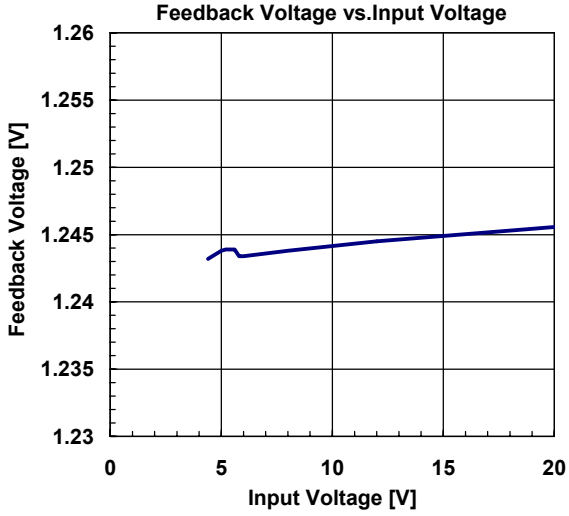


■ TYPICAL CHARACTERISTICS

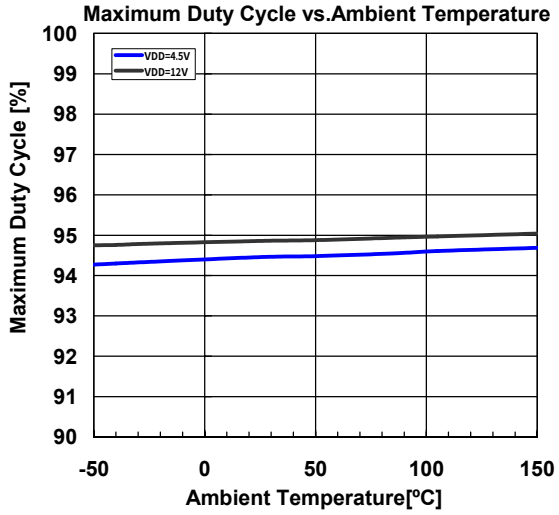
Feedback Voltage vs. Ambient Temperature



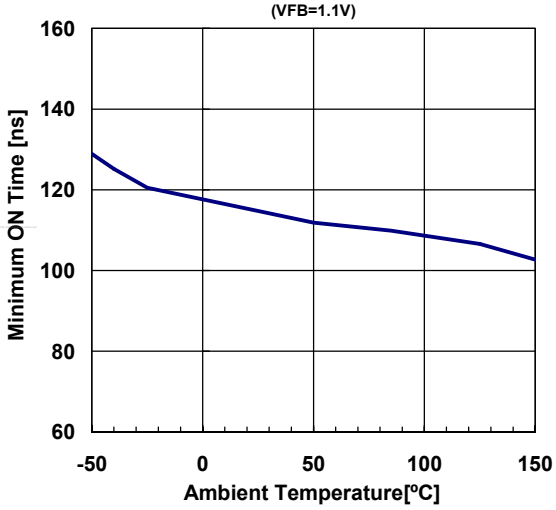
Feedback Voltage vs.Input Voltage



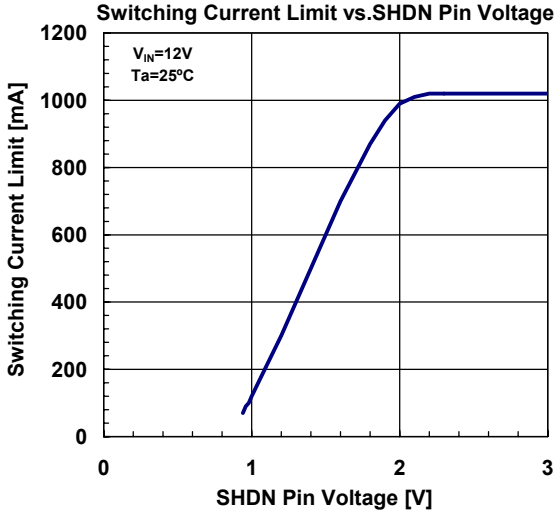
Maximum Duty Cycle vs.Ambient Temperature



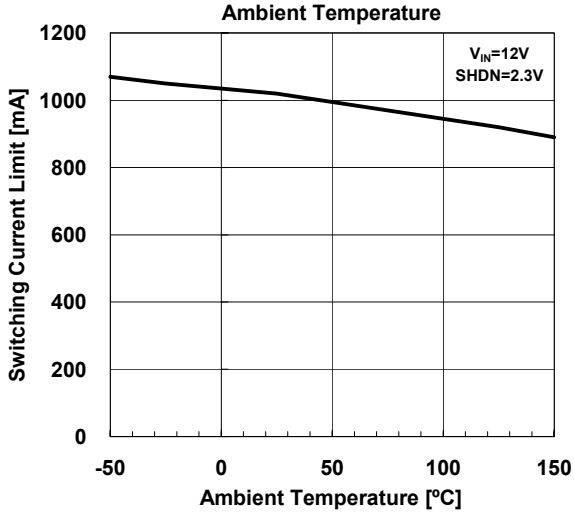
Minimum ON Time vs.Ambient Temperature
(VFB=1.1V)



Switching Current Limit vs.SHDN Pin Voltage

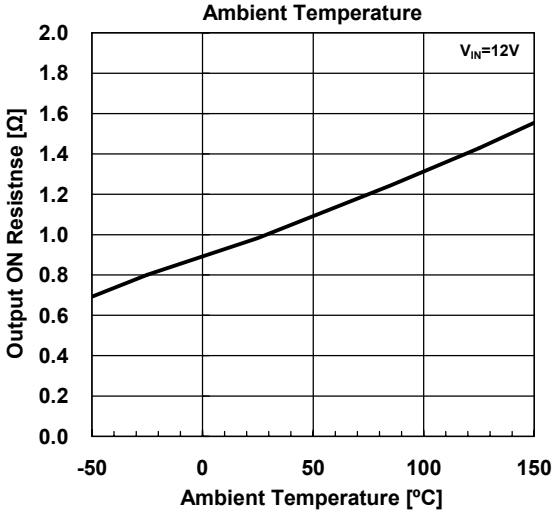


Switching Current Limit vs. Ambient Temperature

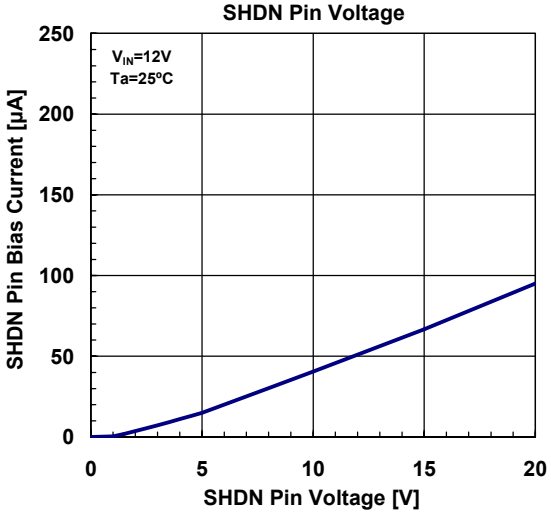


■ TYPICAL CHARACTERISTICS

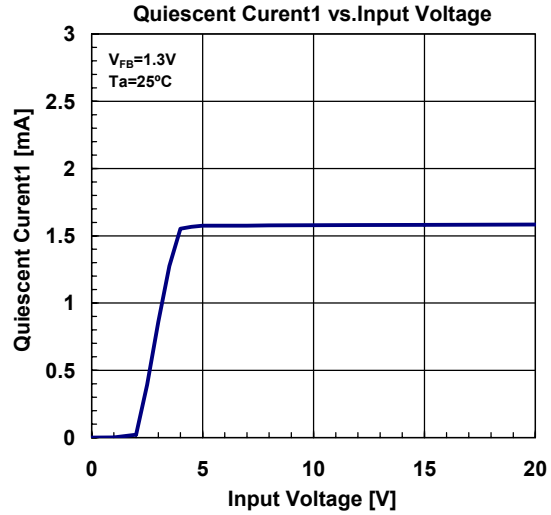
Output ON Resistanse vs. Ambient Temperature



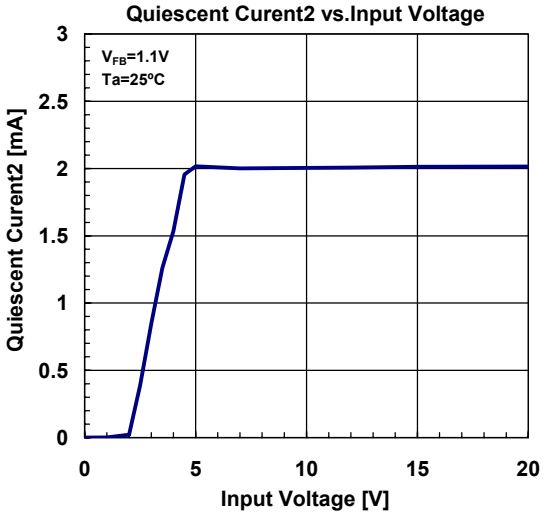
SHDN Pin Bias Current vs. SHDN Pin Voltage



Quiescent Curent1 vs.Input Voltage

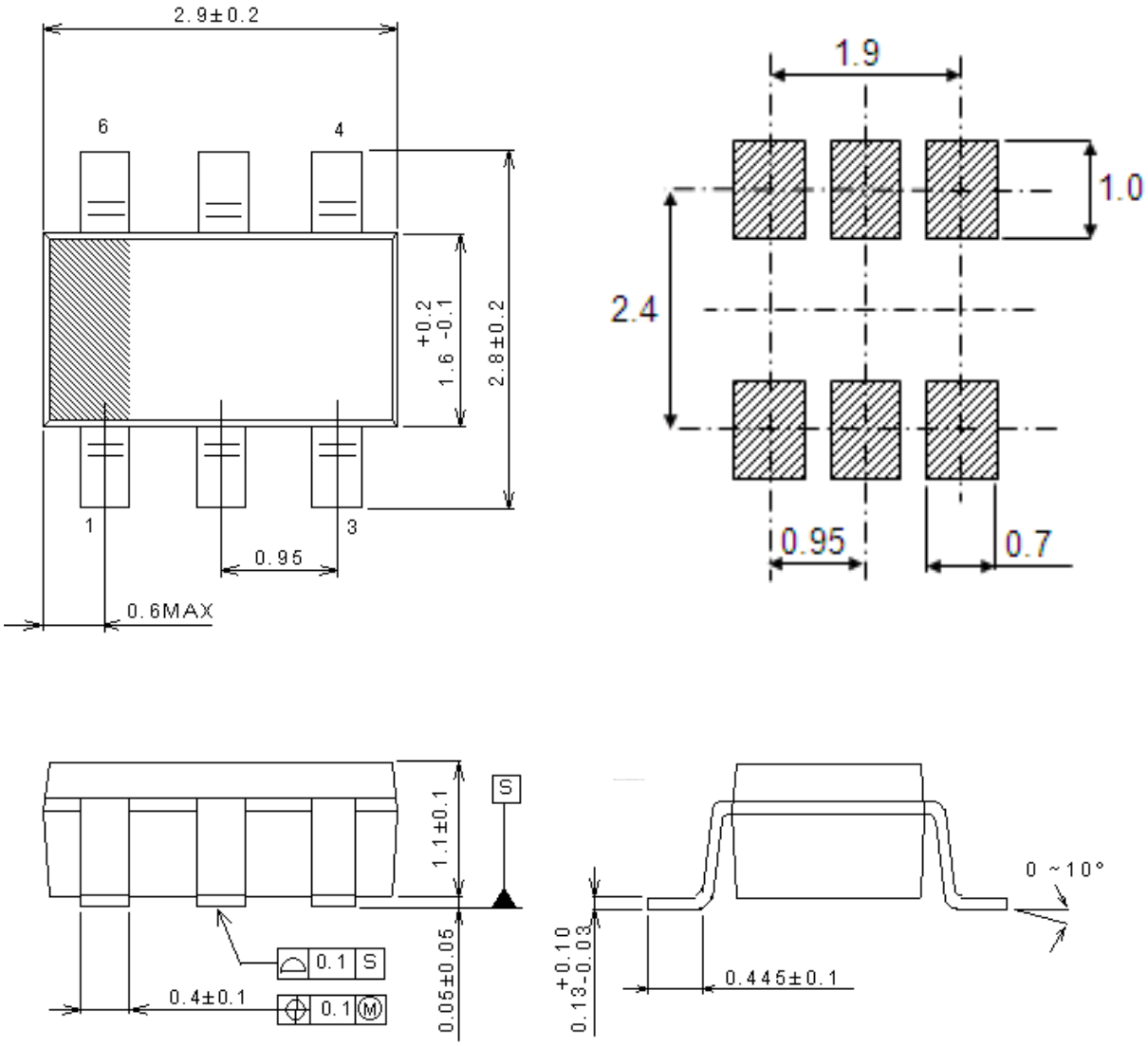


Quiescent Curent2 vs.Input Voltage



PACKAGE OUT LINE

SOT-23-6-1



NOTES

All linear dimensions are in millimeters.

This drawing is subject to change without notice.

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