

**FEATURES**

- Low Dropout Voltage of 250mV at 300mA
- Guaranteed 300mA Output Current
- Very Low Quiescent Current at about 30uA
- ±2% Output Voltage Accuracy for 1.2V~3.3V
- Needs Only 1μF Capacitor for Stability
- Thermal Shutdown Protection
- Current Limit Protection
- Output Voltage Fast Discharge
- Low-ESR Ceramic Capacitor for Output Stability.
- Tiny SC-70-4L、SC-70-5L、SOT-23  
SOT-23-5L & TSOT-23-5L Packages
- RoHS Compliant & Halogen Free
- High PSRR

**DESCRIPTION**

The APE8865 series are low dropout, positive linear regulators with very low quiescent current. The APE8865 can supply 300mA output current with a low dropout voltage at about 250mV.

The APE8865 regulator is able to operate with output capacitors as small as 1μF for stability. Other than the current limit protection APE8865 also offers on chip thermal shutdown feature providing protection against overload or any condition when the ambient temperature exceeds the junction temperature.

The APE8865 series are offering several fixed output voltage types including 1.2V ~ 3.3V.

The APE8865 series are available in low-profile, space-saving SC-70-4L、SC-70-5L、SOT-23、TSOT-23-5L & SOT-23-5L packages.

**APPLICATIONS**

- DVD/CD-ROMs, CD/RWs
- Wireless Devices
- LCD Modules
- Battery Power Systems
- Card Readers
- XDSL Routers

**TYPICAL APPLICATION**

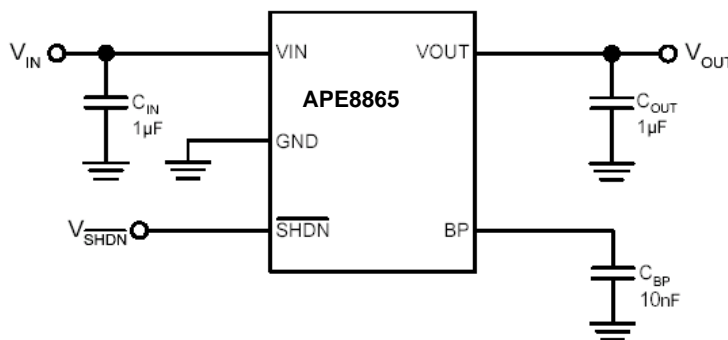


Figure 1. Typical Application Circuit of APE8865

Note : To prevent oscillation, it is recommended to use minimum 1uF X7R or X5R dielectric capacitors if ceramics are used as input / output capacitors.

**ORDERING INFORMATION**

**APE8865 X - XX**

Package Type	Output Voltage			
N : SOT-23	12 : 1.2V	19 : 1.9V	24 : 2.4V	29 : 2.9V
NR : SOT-23	15 : 1.5V	20 : 2.0V	25 : 2.5V	30 : 3.0V
NL : SOT-23	16 : 1.6V	21 : 2.1V	26 : 2.6V	31 : 3.1V
Y5 : SOT-23-5L	17 : 1.7V	22 : 2.2V	27 : 2.7V	32 : 3.2V
TY5 : TSOT-23-5L	18 : 1.8V	23 : 2.3V	28 : 2.8V	33 : 3.3V
U4 : SC-70-4L				
U5 : SC-70-5L				



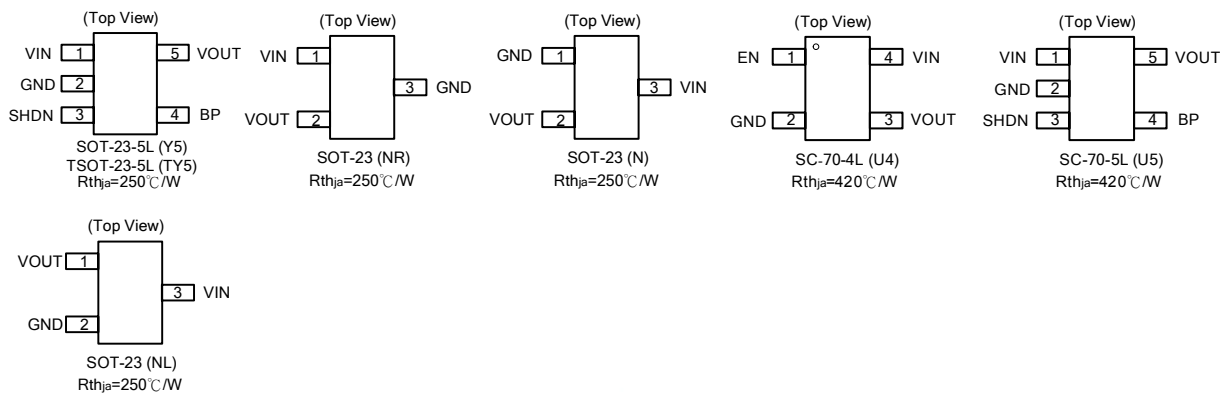
## ABSOLUTE MAXIMUM RATINGS

Input Voltage (VIN) -----	6V
SHDN Voltage (V <sub>SHDN</sub> ) -----	GND - 0.3V to VIN + 0.3V
Power Dissipation (SOT23-5L/TSOT-23-5L) -----	0.4W
(SOT-23) -----	0.4W
(SC70-4L) -----	0.23W
(SC70-5L) -----	0.23W
Storage Temperature Range -----	-65°C To 150°C
Maximum Junction Temperature -----	150°C

## RECOMMENDED OPERATING CONDITIONS

Input Voltage (VIN) -----	2.8 to 5.5V
Operating Junction Temperature Range (T <sub>J</sub> ) -----	-40 to 125°C
Ambient Temperature (T <sub>A</sub> ) -----	-40 to 85°C

## PACKAGE INFORMATION



## ELECTRICAL SPECIFICATIONS

(V<sub>IN</sub>=V<sub>OUT</sub>+1V or V<sub>IN</sub>=2.8V whichever is greater, C<sub>IN</sub>=1uF, C<sub>OUT</sub>=1uF, T<sub>A</sub>=25°C, unless otherwise specified)

Parameter	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS	
Output Voltage Accuracy	ΔV <sub>OUT</sub>	I <sub>O</sub> = 1mA	-2	-	2	%	
Current Limit	I <sub>LIMIT</sub>	R <sub>Load</sub> =1Ω	300	-	-	mA	
Quiescent Current	I <sub>Q</sub>	I <sub>O</sub> = 0mA	-	30	55	μA	
Dropout Voltage (Note 1)	V <sub>DROP</sub>	I <sub>O</sub> =300mA	1.2V ≤ V <sub>OUT</sub> ≤ 2.0V	-	1000	-	mV
			2.0V < V <sub>OUT</sub> ≤ 2.8V	-	350	-	
			2.8V < V <sub>OUT</sub> ≤ 3.3V	-	250	-	
Line Regulation	ΔV <sub>LINE</sub>	I <sub>O</sub> =1mA, V <sub>IN</sub> =V <sub>OUT</sub> +1V to 5V	-	1	5	mV	
Load Regulation (Note 2)	ΔV <sub>LOAD</sub>	I <sub>O</sub> =0mA to 300mA	-	6	20	mV	
Ripple Rejection	PSRR	I <sub>O</sub> =1mA, C <sub>OUT</sub> =1uF, f <sub>RIPPLE</sub> = 100Hz	-	-73	-	dB	
		f <sub>RIPPLE</sub> = 10KHz	-	-50	-		
Temperature Coefficient	TC	I <sub>OUT</sub> = 1mA, V <sub>IN</sub> = 5V	-	50	-	ppm/ °C	
Thermal Shutdown Temperature	TSD		-	160	-	°C	
Thermal Shutdown Hysteresis	ΔTSD		-	25	-	°C	
Shutdown Pin Current	I <sub>SHDN</sub>		-	-	0.1	μA	
Shutdown Pin Voltage (ON)	V <sub>SHDN(ON)</sub>		1.4	-	-	V	
Shutdown Pin Voltage (OFF)	V <sub>SHDN(OFF)</sub>		-	-	0.4	V	
Shutdown Exit Delay Time	ΔT	C <sub>BP</sub> =0.1uF, C <sub>OUT</sub> =1uF, I <sub>OUT</sub> =30mA	-	150	-	μs	

Note 1 : The dropout voltage is defined as V<sub>IN</sub>-V<sub>OUT</sub>, which is measured when V<sub>OUT</sub> drop about 100mV.

Note 2 : Regulation is measured at a constant junction temperature by using 30ms current pulse and load regulation in the load range from 0mA to 300mA.



**PIN DESCRIPTIONS**

PIN SYMBOL	PIN DESCRIPTION
VIN	Power is supplied to this device from this pin which is required an input filter capacitor. In general, the input capacitor in the range of 1 $\mu$ F to 10 $\mu$ F is sufficient.
VOUT	The output supplies power to loads. The output capacitor is required to prevent output voltage unstable. The APE8865 is stable with an output capacitor 1 $\mu$ F or greater. The larger output capacitor will be required for application with large transit load to limit peak voltage transients, besides could reduce output noise, improve stability, PSRR.
GND	Common ground pin
BP	Reference Noise Bypass ( the Bypass Capacitor $\geq$ 1nF )
SHDN	Chip Enable (Active High)

**BLOCK DIAGRAM**

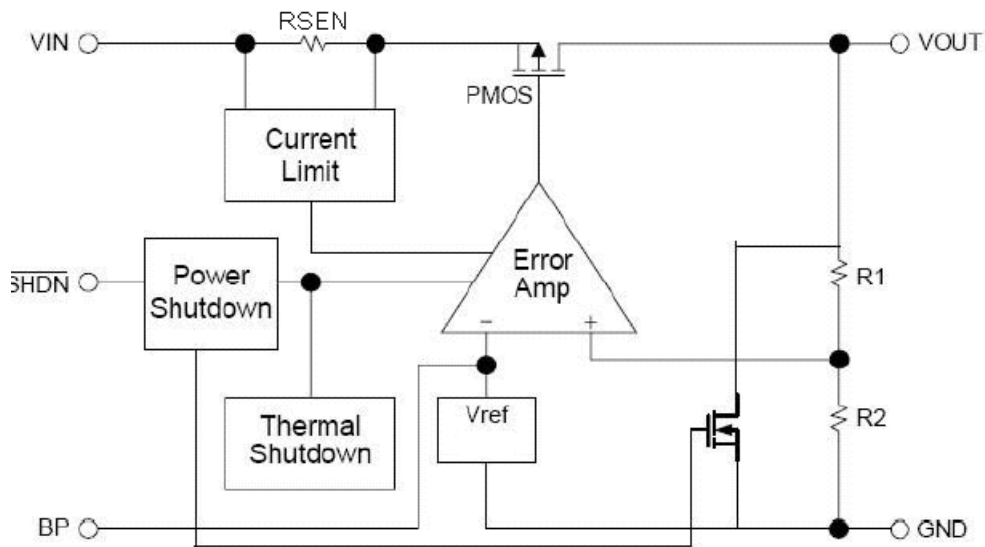
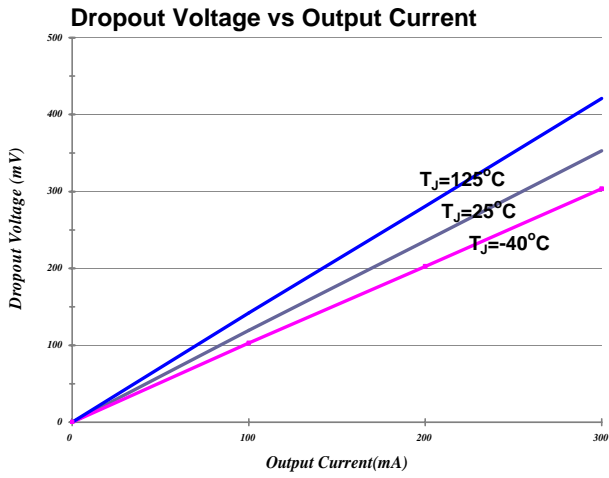


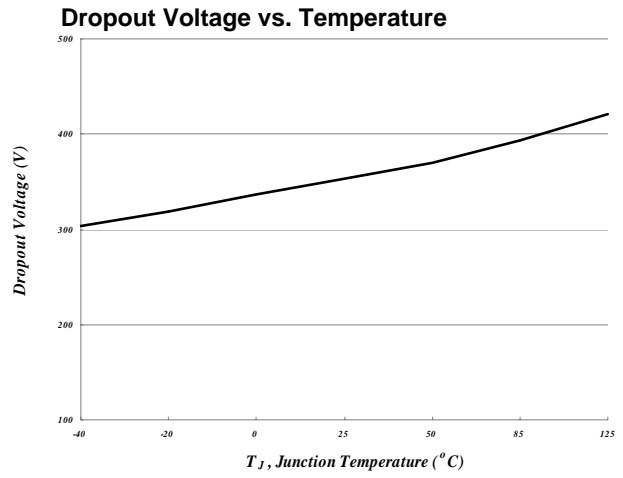
Figure 2. Block Diagram of APE8865 With Auto Discharge



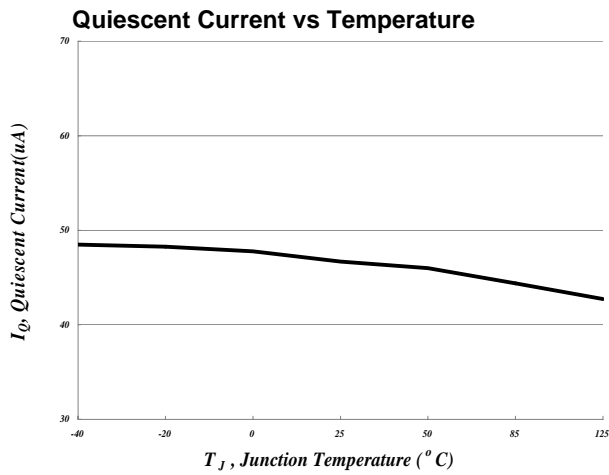
# TYPICAL PERFORMANCE CHARACTERISTICS



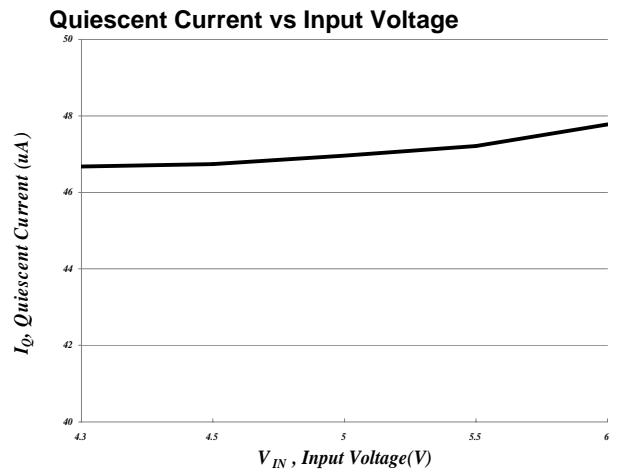
$V_{IN}=4.3\text{V}$ ,  $V_{OUT}=3.3\text{V}$ ,  $I_{OUT}=1 \sim 300\text{mA}$



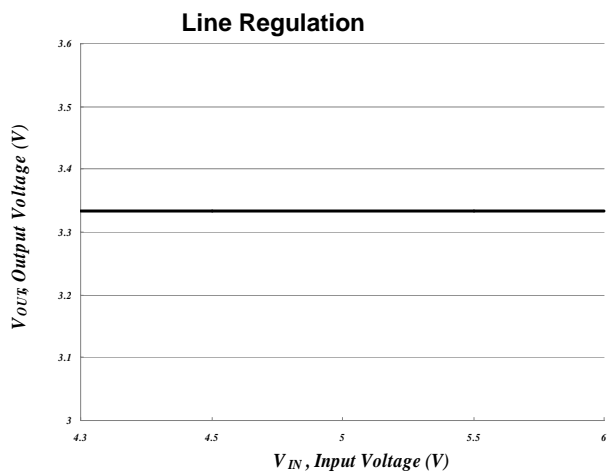
$V_{IN}=4.3\text{V}$ ,  $V_{OUT}=3.3\text{V}$ ,  $I_{OUT}=1 \sim 300\text{mA}$



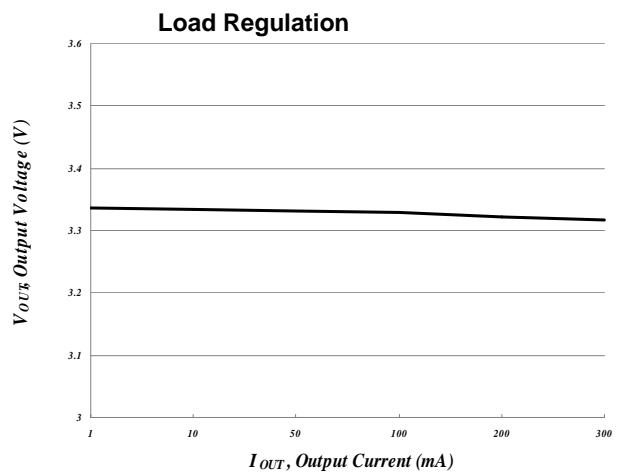
$V_{IN}=4.3 \sim 6\text{V}$ ,  $V_{OUT}=3.3\text{V}$



$V_{IN}=4.3 \sim 6\text{V}$ ,  $V_{OUT}=3.3\text{V}$



$V_{IN}=4.3 \sim 6\text{V}$ ,  $V_{OUT}=3.3\text{V}$ ,  $I_{OUT}=1\text{mA}$



$V_{IN}=4.3\text{V}$ ,  $V_{OUT}=3.3\text{V}$ ,  $I_{OUT}=1 \sim 300\text{mA}$



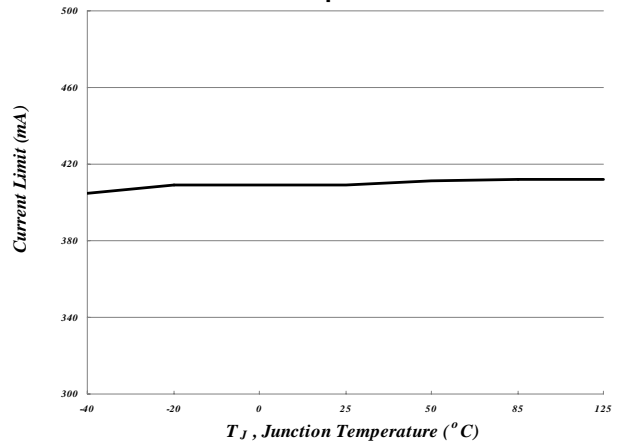
# TYPICAL PERFORMANCE CHARACTERISTICS

### Load Transient



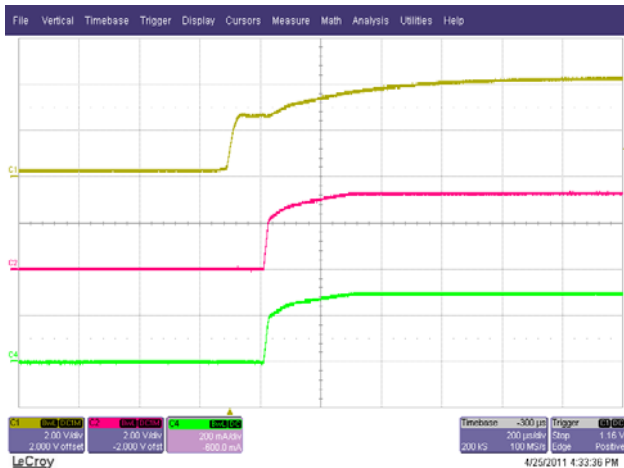
$V_{IN}=4.3V, V_{OUT}=1.8V, E_{LOAD}=10\sim 300mA$

### Current Limit vs Temperature



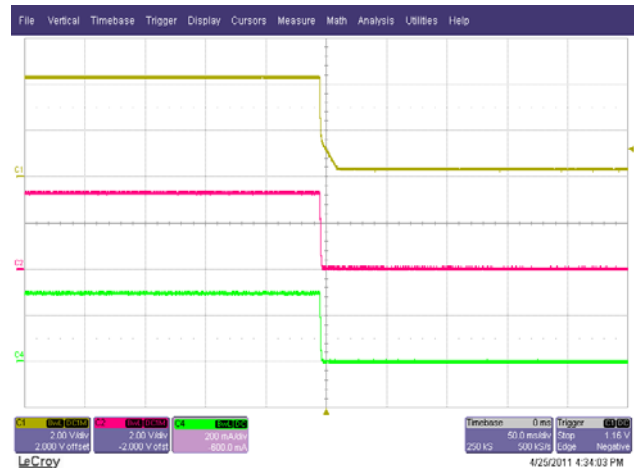
$V_{IN}=4.3V, V_{OUT}=3.3V, E_{LOAD}= \text{Short GND}$

### Power ON



$V_{IN}=4.3V, V_{OUT}=3.3V, R_{OUT}=11\ \Omega$

### Power OFF



$V_{IN}=4.3V, V_{OUT}=3.3V, R_{OUT}=11\ \Omega$

### Enable ON



$V_{IN}=4.3V, V_{OUT}=3.3V, R_{OUT}=11\ \Omega$

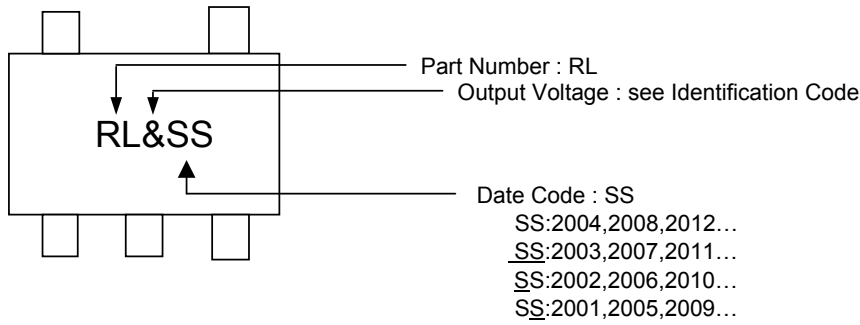
### Enable OFF



$V_{IN}=4.3V, V_{OUT}=3.3V, R_{OUT}=11\ \Omega$

**MARKING INFORMATION**

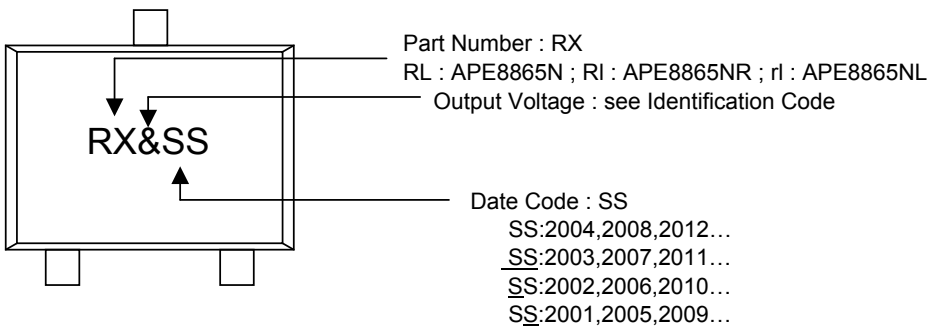
**SOT-23-5L/TSOT-23-5L**



**SOT-23-5L**

V <sub>OUT</sub>	Identification Code	V <sub>OUT</sub>	Identification Code
1.2V	2	2.4V	T
1.5V	5	2.6V	F
1.6V	S	2.6V	f
1.7V	X	2.7V	D
1.8V	A	2.8V	E
1.9V	a	2.9V	h
2.0V	e	3.0V	H
2.1V	B	3.1V	x
2.2V	C	3.2V	U
2.3V	v	3.3V	I

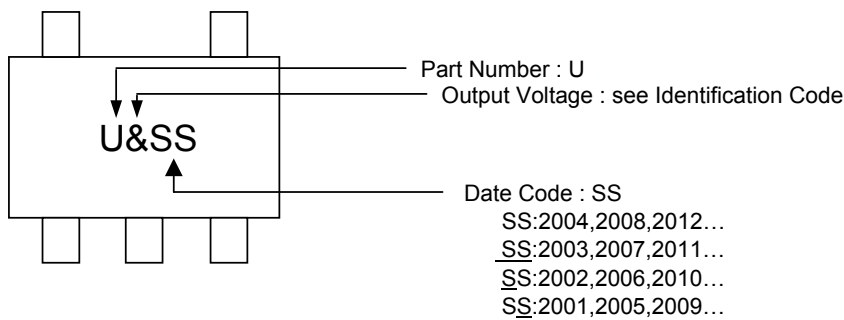
**SOT-23**



**SOT-23**

V <sub>OUT</sub>	Identification Code	V <sub>OUT</sub>	Identification Code
1.2V	2	2.4V	T
1.5V	5	2.5V	F
1.6V	S	2.6V	f
1.7V	X	2.7V	D
1.8V	A	2.8V	E
1.9V	a	2.9V	h
2.0V	e	3.0V	H
2.1V	B	3.1V	x
2.2V	C	3.2V	U
2.3V	v	3.3V	I

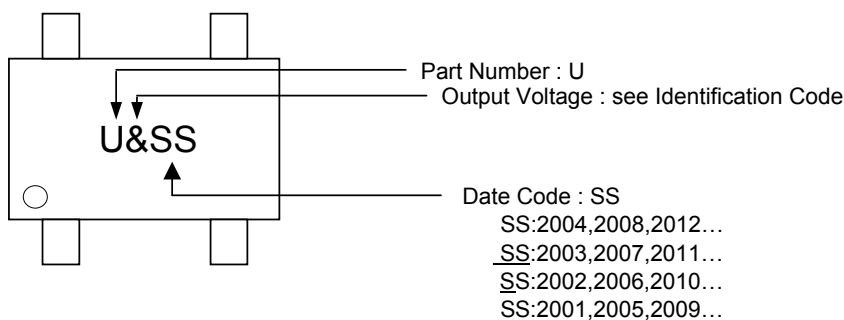
**SC-70-5L**



**SC-70-5L**

V <sub>OUT</sub>	Identification Code	V <sub>OUT</sub>	Identification Code
1.2V	B	2.4V	T
1.5V	C	2.5V	F
1.6V	S	2.6V	f
1.7V	X	2.7V	w
1.8V	D	2.8V	G
1.9V	a	2.9V	h
2.0V	e	3.0V	H
2.1V	b	3.1V	x
2.2V	O	3.2V	U
2.3V	v	3.3V	I

**SC-70-4L**



**SC-70-4L**

V <sub>OUT</sub>	Identification Code	V <sub>OUT</sub>	Identification Code
1.2V	B	2.4V	T
1.5V	C	2.5V	F
1.6V	S	2.6V	f
1.7V	X	2.7V	w
1.8V	D	2.8V	G
1.9V	a	2.9V	h
2.0V	e	3.0V	H
2.1V	b	3.1V	x
2.2V	O	3.2V	U
2.3V	v	3.3V	I