POSITIVE FIXED VOLTAGE REGULATOR

DESCRIPTION

The SG140A/140 series of positive regulators offer self contained, fixed-voltage capability with up to 1.5A of load current and input voltage up to 50V (SG140A series only).

These units feature a unique on-chip trimming system to set the output voltages to within ±1.5% of nominal on the SG140A series and ±2.0% on the SG140 series. The SG140A versions also offer much improved line and load regulation characteristics. Utilizing an improved Bandgap reference design, problems have been eliminated that are normally associated with the Zener Diode references, such as drift in output voltage and large changes in the line and load regulation.

All protective features of thermal shutdown, current limiting, and safe-area control have been designed into these units and since these regulators require only a small output capacitor for satisfactory performance, ease of application is assured.

Although designed as fixed-voltage regulators, the output voltage can be increased through the use of a simple voltage divider. The low quiescent drain current of the device insures good regulation when this method is used.

Product is available in hermetically sealed TO-257 (isolated), TO-3, TO-66, and TO-39 power packages.

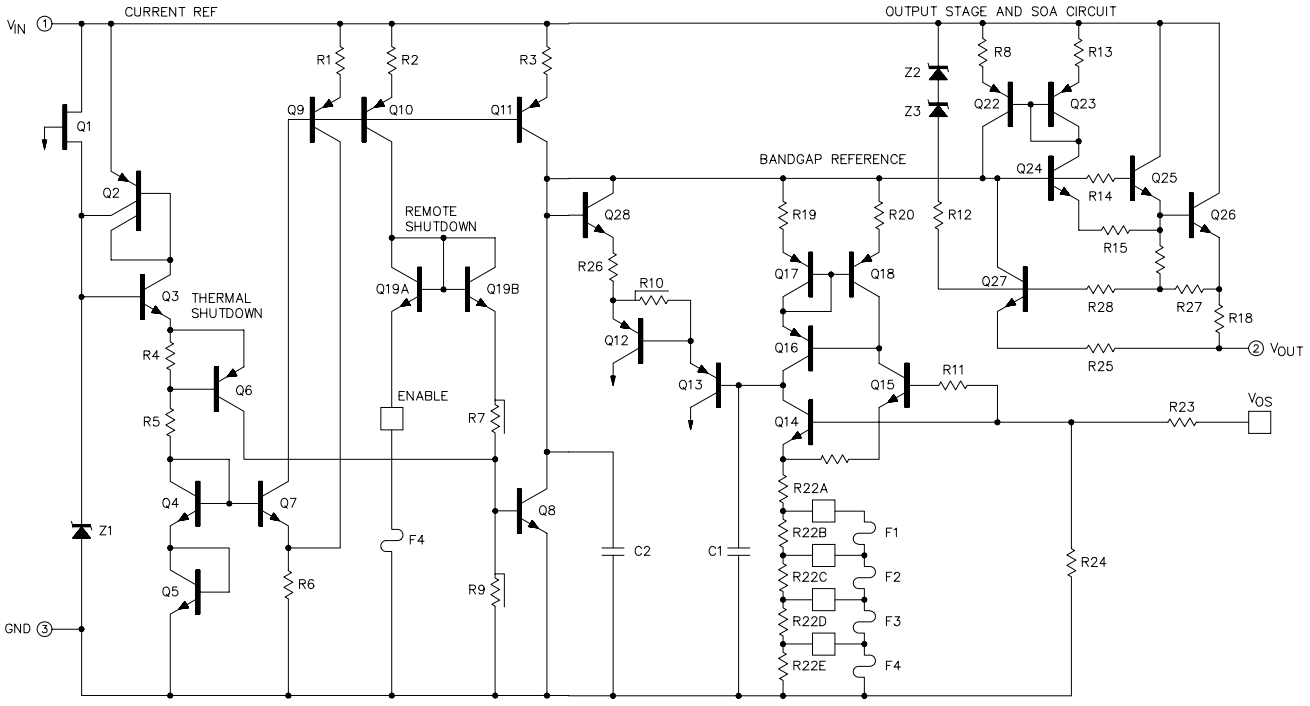
FEATURES

- **Output voltage set internally to ±1.5% on SG140A**
- **Input voltage reange to 50V max. on SG140A**
- **Two volt input-output differential**
- **Bandgap reference voltage**
- **Excellent line and load regulation**
- **Foldback current limiting**
- **Thermal overload protection**
- **Voltages available - 5V, 12V, 15V**
- **Voltages Not Recommended For New Designs - 6V, 8V, 18V, 24V**

HIGH RELIABILITY FEATURES - SG140A/140

- **Available to MIL-STD - 883**
- **Radiation data available**
- **LMI level "S" processing available**

SCHEMATIC DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Note 1)

Device Output Voltage	Input Voltage	Input Voltage (transient) (Note 3)	Input Voltage Differential (Output shorted to ground)
5V	35V	50V	35V
6V	35V	50V	35V
8V	35V	50V	35V
12V	35V	50V	35V
15V	35V	50V	35V
18V	35V	50V	35V
24V	40V	50V	35V

Operating Junction Temperature
Hermetic (K, R, IG - Packages) ..... 150°C

Storage Temperature Range ..... -65°C to 150°C
Lead Temperature (Soldering, 10 Seconds) ..... 300°C

Note 1. Values beyond which damage may occur.

THERMAL DATA

K Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 3.0°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 35°C/W
R Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 5.0°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 40°C/W
T Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 15°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 120°C/W
IG Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 3.5°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 42°C/W
L Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 35°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 120°C/W

Note A. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
Note B. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{JA} numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

RECOMMENDED OPERATING CONDITIONS (Note 2)

Operating Junction Temperature Range:
SG140A/140 ..... -55°C to 150°C

Note 2. Range over which the device is functional.

CHARACTERISTIC CURVES

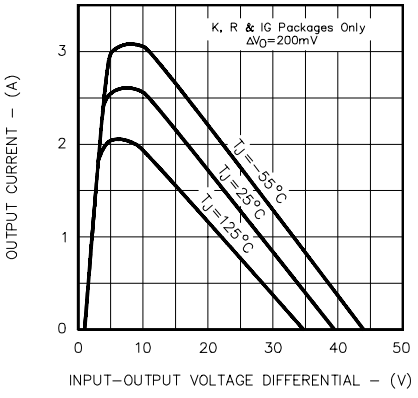

FIGURE 1.
PEAK OUTPUT CURRENT
VS. INPUT - OUTPUT DIFFERENTIAL

Note 3. Operation at high input voltages is dependent upon load current. When load current is less than 5mA, output will rise out of regulation as input-output differential increases beyond 30V. Note also from Figure 1, that maximum load current is reduced at high voltages. The 50V input rating of the SG140A series refers to ability to withstand high line or transient conditions without damage. Since the regulator's maximum current capability is reduced, the output may fall out of regulation at high input voltages under nominal loading.

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CHARACTERISTIC CURVES (continued)

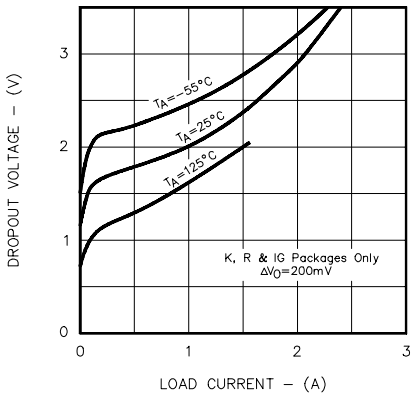

FIGURE 2.
MINIMUM INPUT - OUTPUT VOLTAGE
VS. LOAD CURRENT

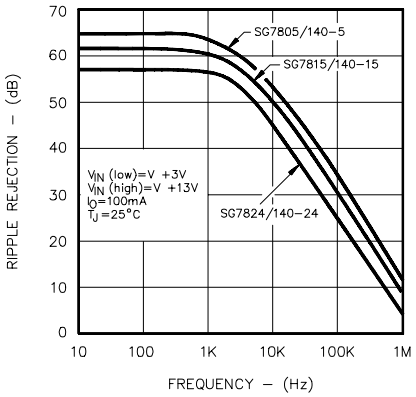

FIGURE 3.
RIPPLE REJECTION VS. FREQUENCY

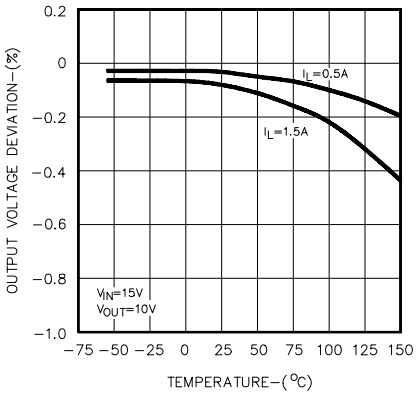

FIGURE 4.
TEMPERATURE COEFFICIENT OF OUTPUT VOLTAGE

APPLICATIONS

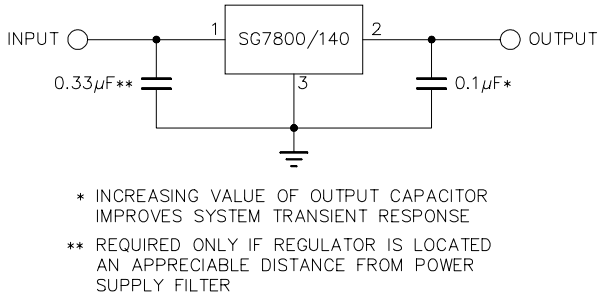

FIGURE 5 - FIXED OUITPUT REGULATOR

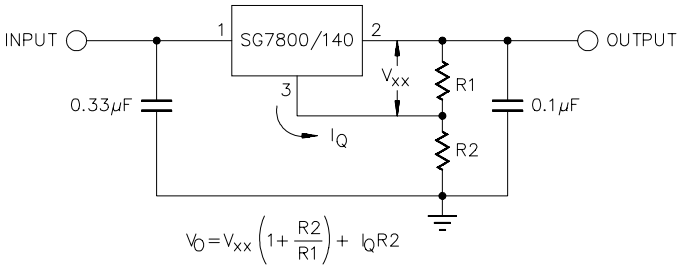

FIGURE 6 - CIRCUIT FOR INCREASING OUITPUT VOLTAGE

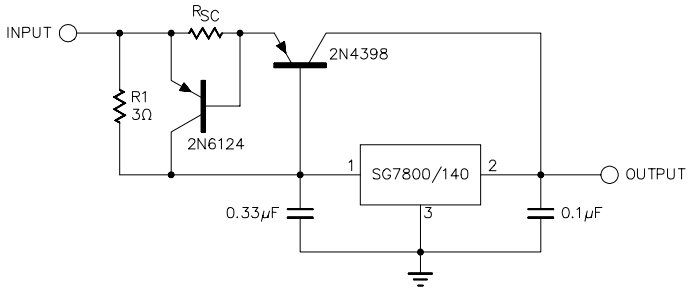

FIGURE 7 - HIGH OUTPUT CIRRENT, SHORT CIRCUIT PROTECTED

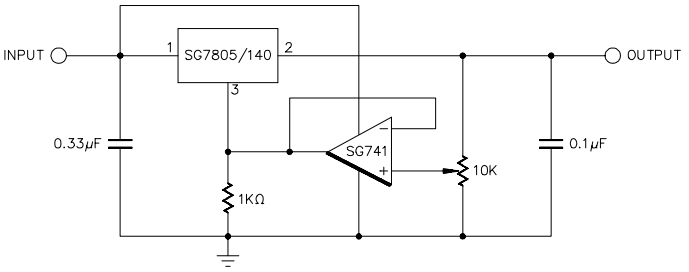

FIGURE 8 - ADJUTABLE OUITPUT REGULATOR, 7V to 30V

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ELECTRICAL CHARACTERISTICS (Note 1)

SG140A - 5

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140A-05 with -55°C ≤ T_A ≤ 150°C, V_{IN} = 10V, I_O = 1.0A, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only. Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140A-5			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	4.9	5.0	5.1	V
Line Regulation (Note 1)	V_{IN} = 7.5V to 20V, I_O = 500mA			10	mV
	V_{IN} = 7.5V to 20V, T_J = 25°C		3	10	mV
	V_{IN} = 7.5V to 20V			12	mV
	V_{IN} = 8V to 12V, T_J = 25°C			4	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			25	mV
	I_O = 5mA to 1.5A, T_J = 25°C		10	25	mV
	I_O = 250mA to 750mA, T_J = 25°C			15	mV
Total Output Voltage Tolerance	V_{IN} = 7.5V to 20V, I_O = 5mA to 1.0A, P ≤ 15W	4.8	5.0	5.2	V
Quiescent Current	Over Temperature Range			6.5	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 7.5V to 25V, I_O = 500mA			0.8	mA
	V_{IN} = 7.5V to 20V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	68			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		20		mV
Thermal Shutdown	I_O = 5mA		175		°C

SG140 - 5

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-05 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 10V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only. Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140-5			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	4.8	5.0	5.2	V
Line Regulation (Note 1)	V_{IN} = 8V to 20V			50	mV
	V_{IN} = 7V to 25V, T_J = 25°C			50	mV
	V_{IN} = 8V to 12V, I_O = 1.0A			25	mV
	V_{IN} = 7.3V to 20V, I_O = 1.0A, T_J = 25°C			50	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			50	mV
	I_O = 5mA to 1.5A, T_J = 25°C			50	mV
	I_O = 250mA to 750mA, T_J = 25°C			25	mV
Total Output Voltage Tolerance	V_{IN} = 8V to 20V, I_O = 5mA to 1.0A, P ≤ 15W	4.75	5.00	5.25	V
Quiescent Current	I_O = 1.0A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 8V to 25V			0.8	mA
	V_{IN} = 8V to 20V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	68			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		20		mV
Thermal Shutdown	I_O = 5mA		175		°C

Note 1. All regulation tests are made at constant junction temperature with low duty cycle testing.
2. This test is guaranteed but is not tested in production.

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ELECTRICAL CHARACTERISTICS (Note 1)

SG140 - 6

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-06 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 11V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 6			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	5.75	6.00	6.25	V
Line Regulation (Note 1)	V_{IN} = 9V to 21V			60	mV
	V_{IN} = 8V to 25V, T_J = 25°C			60	mV
	V_{IN} = 9V to 13V, I_O = 1.0 A			30	mV
	V_{IN} = 8.3V to 21V, I_O = 1.0 A, T_J = 25°C			60	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			60	mV
	I_O = 5mA to 1.5A, T_J = 25°C			60	mV
	I_O = 250mA to 750mA, T_J = 25°C			30	mV
Total Output Voltage Tolerance	V_{IN} = 9V to 21V, I_O = 5mA to 1.0A, P ≤ 15W	5.7	6.0	6.3	V
Quiescent Current	I_O = 1.0 A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 9V to 25V			0.8	mA
	V_{IN} = 9V to 21V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	65			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		24		mV
Thermal Shutdown	I_O = 5mA		175		°C

SG140 - 8

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-08 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 14V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 8			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	7.7	8.0	8.3	V
Line Regulation (Note 1)	V_{IN} = 11V to 23V			80	mV
	V_{IN} = 10.5V to 25V, T_J = 25°C			80	mV
	V_{IN} = 11V to 17V, I_O = 1.0A			40	mV
	V_{IN} = 10.5V to 23V, I_O = 1.0A, T_J = 25°C			80	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			80	mV
	I_O = 5mA to 1.5A, T_J = 25°C			80	mV
	I_O = 250mA to 750mA, T_J = 25°C			40	mV
Total Output Voltage Tolerance	V_{IN} = 11.5V to 23V, I_O = 5mA to 1.0A, P ≤ 15W	7.6	8.0	8.4	V
Quiescent Current	I_O = 1.0A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 11.5V to 25V			0.8	mA
	V_{IN} = 11.5V to 23V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	62			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		32		mV
Thermal Shutdown	I_O = 5mA		175		°C

Note 1. All regulation tests are made at constant junction temperature with low duty cycle testing.
2. This test is guaranteed but is not tested in production.

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ELECTRICAL CHARACTERISTICS (Note 1)

SG140 A - 12

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140A -12 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 19V, I_O = 1.0A, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140A - 12			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	11.75	12.00	12.25	V
Line Regulation (Note 1)	V_{IN} = 14.8V to 27V, I_O = 500mA			18	mV
	V_{IN} = 14.5V to 27V, T_J = 25°C		4	18	mV
	V_{IN} = 16V to 22V			30	mV
	V_{IN} = 16V to 22V, T_J = 25°C			9	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			60	mV
	I_O = 5mA to 1.5A, T_J = 25°C			32	mV
	I_O = 250mA to 750mA, T_J = 25°C			19	mV
Total Output Voltage Tolerance	V_{IN} = 14.8V to 27V, I_O = 5mA to 1.0A, P ≤ 15W	11.5	12.0	12.5	V
Quiescent Current	Over Temperature Range			6.5	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 15V to 30V, I_O = 500mA			0.8	mA
	V_{IN} = 14.8V to 27V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	61			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		48		mV
Thermal Shutdown	I_O = 5mA		175		°C

SG140 - 12

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-12 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 19V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 12			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	11.5	12.0	12.5	V
Line Regulation (Note 1)	V_{IN} = 15V to 27V			120	mV
	V_{IN} = 14.5V to 30V, T_J = 25°C			120	mV
	V_{IN} = 16V to 22V, I_O = 1.0A			60	mV
	V_{IN} = 14.6V to 27V, I_O = 1.0A, T_J = 25°C			120	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			120	mV
	I_O = 5mA to 1.5A, T_J = 25°C			120	mV
	I_O = 250mA to 750mA, T_J = 25°C			60	mV
Total Output Voltage Tolerance	V_{IN} = 14.5V to 27V, I_O = 5mA to 1.0A, P ≤ 15W	11.4	12.0	12.6	V
Quiescent Current	I_O = 1.0A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 15V to 30V			0.8	mA
	V_{IN} = 14.5V to 27V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	61			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		48		mV
Thermal Shutdown	I_O = 5mA		175		°C

Note 1. All regulation tests are made at constant junction temperature with low duty cycle testing.
2. This test is guaranteed but is not tested in production.

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ELECTRICAL CHARACTERISTICS (Note 1)

SG140 A - 15

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140A -15 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 23V, I_O = 1.0A, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140A - 15			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	14.7	15.0	15.3	V
Line Regulation (Note 1)	V_{IN} = 17.9V to 30V, I_O = 500mA			22	mV
	V_{IN} = 7.5V to 30V, T_J = 25°C			22	mV
	V_{IN} = 20V to 26V			30	mV
	V_{IN} = 20V to 26V, T_J = 25°C			10	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			75	mV
	I_O = 5mA to 1.5A, T_J = 25°C			35	mV
	I_O = 250mA to 750mA, T_J = 25°C			21	mV
Total Output Voltage Tolerance	V_{IN} = 17.9V to 30V, I_O = 5mA to 1.0A, P ≤ 15W	14.4	15.0	15.6	V
Quiescent Current	Over Temperature Range			6.5	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 17.9V to 30V, I_O = 500mA			0.8	mA
	V_{IN} = 17.9V to 30V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	60			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		60		mV
Thermal Shutdown	I_O = 5mA		175		°C

SG140 - 15

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-15 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 23V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 15			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	14.4	15.0	15.6	V
Line Regulation (Note 1)	V_{IN} = 18.5V to 30V			150	mV
	V_{IN} = 17.5V to 30V, T_J = 25°C			150	mV
	V_{IN} = 20V to 26V, I_O = 1.0A			75	mV
	V_{IN} = 17.7V to 30V, I_O = 1.0A, T_J = 25°C			150	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			150	mV
	I_O = 5mA to 1.5A, T_J = 25°C			150	mV
	I_O = 250mA to 750mA, T_J = 25°C			75	mV
Total Output Voltage Tolerance	V_{IN} = 17.5V to 30V, I_O = 5mA to 1.0A, P ≤ 15W	14.25	15.00	15.75	V
Quiescent Current	I_O = 1.0A			8.5	mA
	T_J = 25°C			8	mA
Quiescent Current Change	With Line: V_{IN} = 18.5V to 30V			1.0	mA
	V_{IN} = 18.5V to 30V, I_O = 1A, T_J = 25°C			1.0	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	54			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		60		mV
Thermal Shutdown	I_O = 5mA		175		°C

Note 1. All regulation tests are made at constant junction temperature with low duty cycle testing.
2. This test is guaranteed but is not tested in production.

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ELECTRICAL CHARACTERISTICS (Note 1)

SG140 - 18

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-18 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 27V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 18			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	17.3	18.0	18.7	V
Line Regulation (Note 1)	V_{IN} = 21.5V to 33V			180	mV
	V_{IN} = 21V to 33V, T_J = 25°C			180	mV
	V_{IN} = 24V to 30V, I_O = 1.0A			90	mV
	V_{IN} = 21V to 30V, I_O = 1.0A, T_J = 25°C			180	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			180	mV
	I_O = 5mA to 1.5A, T_J = 25°C			180	mV
	I_O = 250mA to 750mA, T_J = 25°C			90	mV
Total Output Voltage Tolerance	V_{IN} = 21V to 33V, I_O = 5mA to 1.0A, P ≤ 15W	17.1	18.0	18.9	V
Quiescent Current	I_O = 1A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 21V to 33V			0.8	mA
	V_{IN} = 21V to 33V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	59			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		72		mV
Thermal Shutdown	I_O = 5mA		175		°C

SG140 - 24

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SG140-24 with -55°C ≤ T_A ≤ 150°C, and V_{IN} = 33V, I_O = 500mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF and are applicable for the K, R, and IG - Power package - only Low duty cycle pulse testing techniques are used which maintains junction and case temperature equal to the ambient temperature.)

Parameter	Test Conditions	SG140 - 24			Units
		Min.	Typ.	Max.	
Output Voltage	I_O = 5mA to 1.0A, T_J = 25°C	23	24	25	V
Line Regulation (Note 1)	V_{IN} = 28V to 38V			240	mV
	V_{IN} = 27V to 38V, T_J = 25°C			240	mV
	V_{IN} = 30V to 36V, I_O = 1.0A			120	mV
	V_{IN} = 27.1V to 35V, I_O = 1.0A, T_J = 25°C			240	mV
Load Regulation (Note 1)	I_O = 5mA to 1.0A			240	mV
	I_O = 5mA to 1.5A, T_J = 25°C			240	mV
	I_O = 250mA to 750mA, T_J = 25°C			120	mV
Total Output Voltage Tolerance	V_{IN} = 27V to 38V, I_O = 5mA to 1.0A, P ≤ 15W	22.8	24.0	25.2	V
Quiescent Current	I_O = 1.0A			7	mA
	T_J = 25°C			6	mA
Quiescent Current Change	With Line: V_{IN} = 27V to 38V			0.8	mA
	V_{IN} = 28V to 38V, I_O = 1A, T_J = 25°C			0.8	mA
	With Load: I_O = 5mA to 1.0A			0.5	mA
Dropout Voltage	ΔV_O = 100mV, I_O = 1A, T_J = 25°C		2	2.5	V
Peak Output Current	T_J = 25°C		2.4		A
Short Circuit Current	T_J = 25°C		2.1		A
Ripple Rejection	ΔV_{IN} = 10V, f = 120Hz, T_J = 25°C	56			dB
Output Noise Voltage (rms)	f = 10Hz to 100KHz (Note 2)			40	µV/V
Long Term Stability	1000hrs. at T_J = 125°C		96		mV
Thermal Shutdown	I_O = 5mA		175		°C

Note 1. All regulation tests are made at constant junction temperature with low duty cycle testing.
2. This test is guaranteed but is not tested in production.

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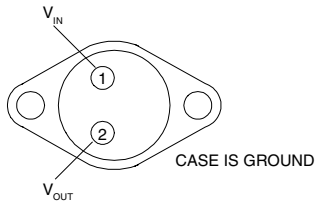
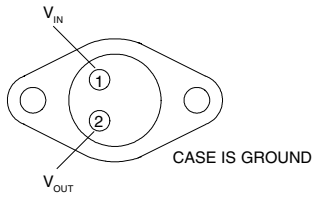
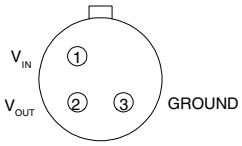
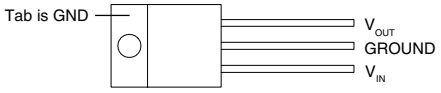
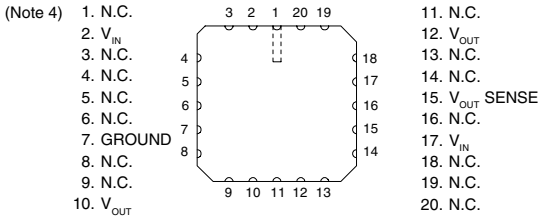
CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
3-TERMINAL TO-3 METAL CAN K-PACKAGE	SG140-XXK/883B SG140-XXK	-55°C to 125°C -55°C to 125°C	
3-TERMINAL TO-66 METAL CAN R-PACKAGE	SG140-XXR/883B SG140-XXR	-55°C to 125°C -55°C to 125°C	
3-PIN TO-39 METAL CAN T-PACKAGE	SG140-XXT/883B SG140-XXT	-55°C to 125°C -55°C to 125°C	
3-PIN HERMETIC TO-257 IG-PACKAGE (Isolated)	SG140A-XXIG/883B SG140A-XXIG SG140-XXIG/883B SG140-XXIG	-55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C	
20-PIN CERAMIC (LCC) LEADLESS CHIP CARRIER L- PACKAGE	SG140-XXL/883B SG140-XXL	-55°C to 125°C -55°C to 125°C	

Note 1. Contact factory for JAN and DESC product availability.
2. All parts are viewed from the top.
3. "XX" to be replaced by output voltage of specific fixed regulator.
4. Some products will be available in leadless chip carrier (LCC). Consult factory for price and availability.

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