MIL-PRF-38534 AND 38535 CERTIFIED FACILITY

M.S.KENNEDY CORP.

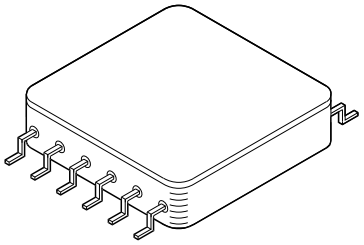
ULTRA-HIGH TEMPERATURE REGULATOR

5500 -15

4707 Dey Road Liverpool, N.Y. 13088 (315) 701-6751

FEATURES:

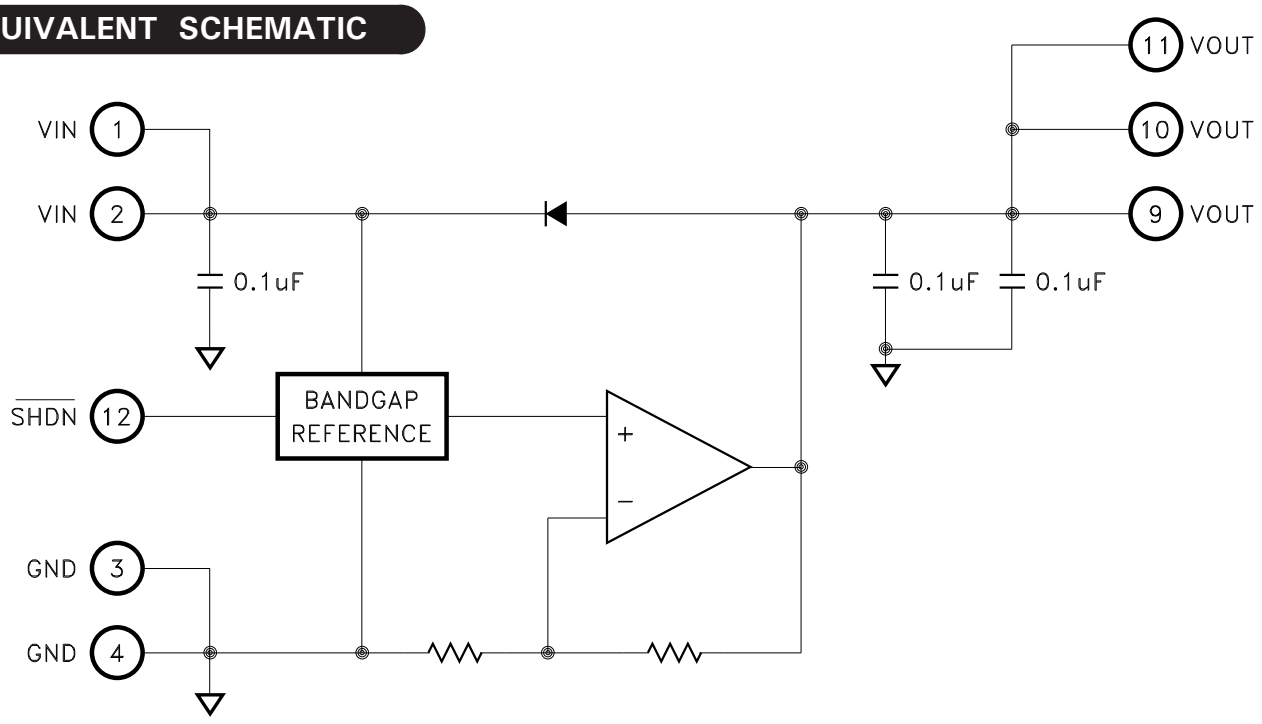
- Operational from -55°C to +232°C
- Input Voltage from Vout + Dropout to 40V
- Output Current up to 50mA @ 232°C
- Soft-Start Feature
- Stable Over a Wide Range of Load Capacitance
- Low Standby Current Consumption (38uA @ 232°C)
- Active-Low Shutdown Control
- Surface Mount Package With Lead Forming
- Contact MSK for Qualification Status



DESCRIPTION:

The MSK 5500-15 is a low power voltage regulator/reference capable of delivering 50mA of output current at 232°C. Typical dropout is 0.450 volts with a 10mA load at 232°C. An external shutdown function is ideal for power supply sequencing. This device also has short circuit protection that requires no external current sense resistor. The MSK 5500-15 is specifically designed for automotive, aeronautics and aerospace, and down-hole applications. The device is packaged in a hermetically sealed 12 pin flatpack that is formed for surface mount applicatins.

EQUIVALENT SCHEMATIC



TYPICAL APPLICATIONS

- Reliability-Critical, Automotive, Aeronautics & Aerospace, Down-Hole
- Precision Regulators/References, A/D and D/A Converters, Current Sources

PIN-OUT INFORMATION

1	VIN	12	$\overline{\text{SHDN}}$
2	VIN	11	VOUT
3	GND	10	VOUT
4	GND	9	VOUT
5	NC	8	NC
6	NC	7	NC

CASE = ISOLATED

ABSOLUTE MAXIMUM RATINGS ⑤

VIN with Respect to GND. . . . . .-0.5 to 50V
$\overline{SHDN}$ with Respect to GND. . . . .-0.5 to VIN+0.5V
Storage Temperature Range. . . . . .-65°C to +250°C
Case Operating Temperature Range. .-55°C to +232°C

ELECTRICAL SPECIFICATIONS

Parameter	Test Conditions ①	Group A Subgroup	MSK 5500-15H Min.	MSK 5500-15H Typ.	MSK 5500-15H Max.	MSK 5500-15 Min.	MSK 5500-15 Typ.	MSK 5500-15 Max.	Units
OUTPUT CHARACTERISTIC									
Nominal Output Voltage		-	-	15	-	-	15	-	V
Output Voltage Tolerance VIN = 18V	I_L = 10mA	1	14.95	15	15.05	14.95	15	15.05	V
	I_L = 40mA	1	14.92	14.98	15.05	14.92	14.98	15.05	V
	I_L = 10mA	2	14.95	15.06	15.16	-	-	-	V
	I_L = 40mA	2	14.95	15.00	15.10	-	-	-	V
	I_L = 10mA	3	14.75	14.89	15.02	-	-	-	V
	I_L = 40mA	3	14.75	14.88	15.01	-	-	-	V
Dropout Voltage	I_{LOAD} = 10mA	1	-	241	280	-	241	280	mV
		2	-	466	560	-	-	-	mV
		3	-	191	270	-	-	-	mV
	I_{LOAD} = 50mA ①	1	-	1.2	-	-	1.2	-	V
		2	-	2.5	-	-	-	-	V
		3	-	1.0	-	-	-	-	V
Line Regulation	18V ≤ VIN ≤ 40V	1	-2.1	-1.4	0.0	-2.1	-1.4	0.0	mV/V
		2	-4.2	-3.3	0.0	-	-	-	
	I_L = 10mA	3	-1.5	-0.5	0.5	-	-	-	
SUPPLY CURRENT									
Shut-Down Mode Current, I Standby	$V_{\overline{SHDN}} \leq 0.6V$	1,3	-	16	-	-	16	-	uA
	VIN = 18V	2	-	30	-	-	-	-	
SHUT-DOWN									
Enable Voltage	$V_{\overline{SHDN}}$ GOING UP	1,2,3	-	1.3	2.3	-	1.5	2.3	V
Shut-Down Voltage	$V_{\overline{SHDN}}$ GOING DOWN	1,2,3	0.6	1.3	-	0.6	1.0	-	V
$\overline{SHDN}$ Current	$V_{\overline{SHDN}}$ = 0V	1,2,3	-8	-	0	-8	-	0	uA
	$V_{\overline{SHDN}}$ = 5V	1,2,3	-0.5	-	1	-0.5	-	1	uA
DYNAMIC CHARACTERISTICS									
Turn-ON Time vs. VIN	I_L = 10mA	4	-	600	-	-	600	-	uS
Turn-ON Time vs. $\overline{SHDN}$	I_L = 10mA	4	-	850	-	-	850	-	uS
Ripple Rejection ①	Frequency = 1KHz	-	-	-40	-	-	-40	-	dB

NOTES:

① Guaranteed by design but not tested. Typical parameters are representative of actual device performance but are for reference only.
② Military grade devices ("H" suffix) shall be 100% tested to subgroups 1,2,3 and 4.
③ Subgroup 1,4 $T_A = T_C = +25°C$
2 $T_A = T_C = +232°C$
3 $T_A = T_C = -55°C$
④ Industrial grade devices shall be 100% tested at 25°C only.
⑤ Continuous operation at or above absolute maximum ratings may adversely effect the device performance and/or life cycle.

APPLICATION NOTES

PIN FUNCTIONS

VIN - These pins provide the input power connection to the MSK 5500-15.

GND - These pins provide the input and output ground reference.

VOUT - These are the output pins for the device. All three pins must be connected for proper operation.

$\overline{\text{SHDN}}$ - This pin is used to disable the output and is logic low.

INPUT AND OUTPUT BYPASSING

Proper input bypassing is required in order to filter out noise and provide low AC impedance source. The MSK 5500-15 has an internal 0.1uF ceramic capacitor connected between VIN and GND. In most application the internal input capacitor will be sufficient for proper operation. Additional input capacitance can be added to maximize transient response and minimize power supply transients. For stability the MSK 5500-15 has an internal 0.2uF low ESR capacitor connected between VOUT and GND. To improve transient response additional capacitance up to 4.7uF can be added if needed.

THERMAL LIMITING

The MSK 5500-15 has no internal thermal shutdown feature. Operation above 232°C is possible at the expensive of reducing product lifetime.

START UP OPTIONS

The MSK 5500-15 has been designed to provide a soft-start with little to no overshoot. If slight overshoot is observed when turning on into a light load adding output capacitance will eliminate the overshoot.

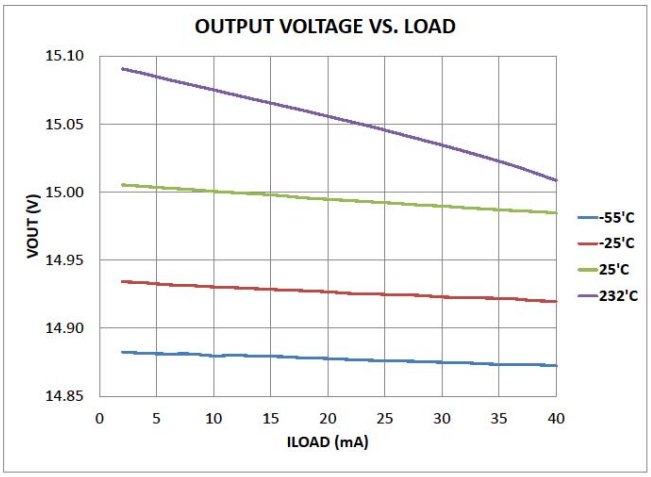
OVERCURRENT PROTECTION

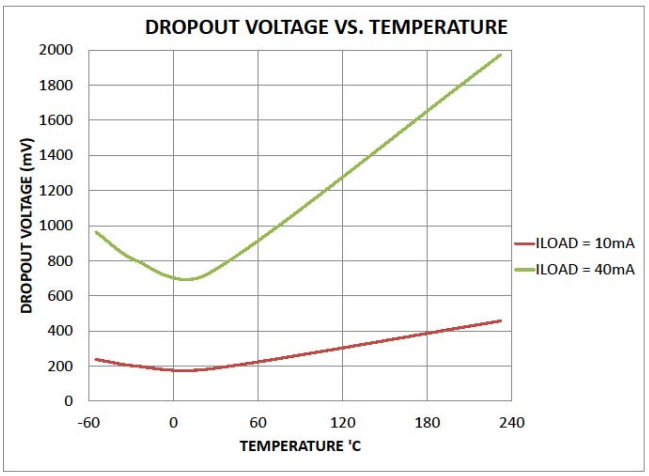
The MSK 5500-15 has a short circuit protection feature it is, however, not able to sink current. Doing so could damage the regulator.

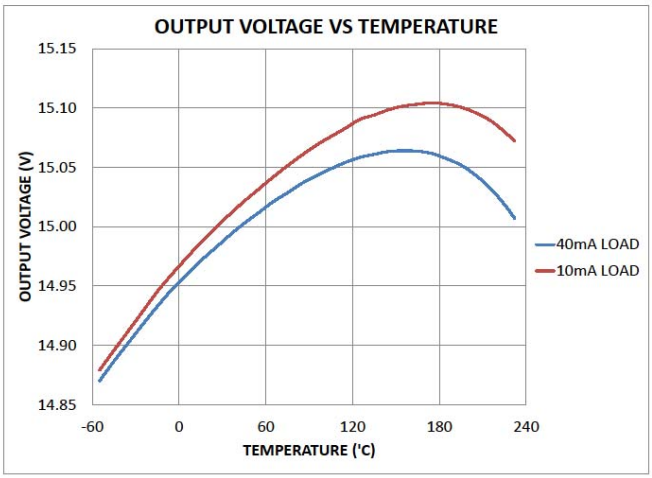
SHUTDOWN

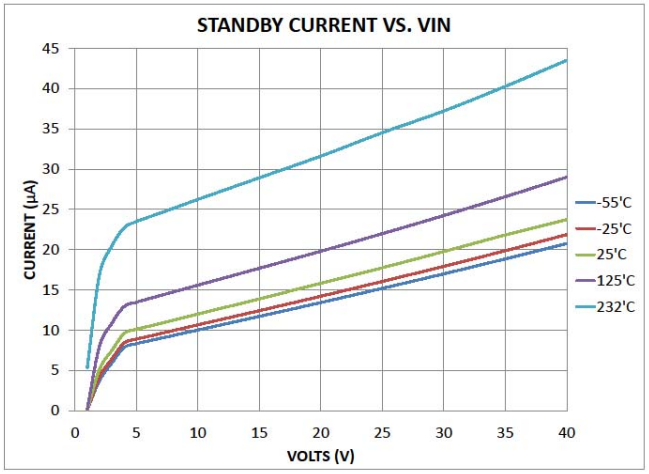
The MSK 5500-15 has a shut-down feature that will set the output of the regulator to high impedance. The feature helps reduce power consumption by 90% in power-critical applications. A voltage lower then 0.6V on the $\overline{\text{SHDN}}$ pin will put the regulator into shut-down mode. A voltage of greater than 2.3V on the $\overline{\text{SHDN}}$ pin will turn the regulator on.

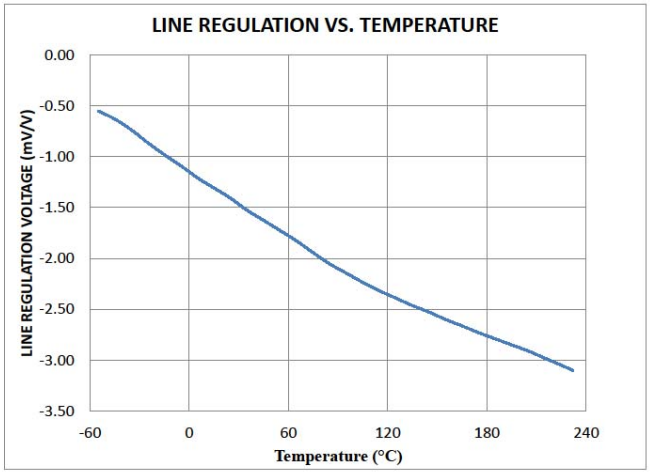
TYPICAL PERFORMANCE CURVES



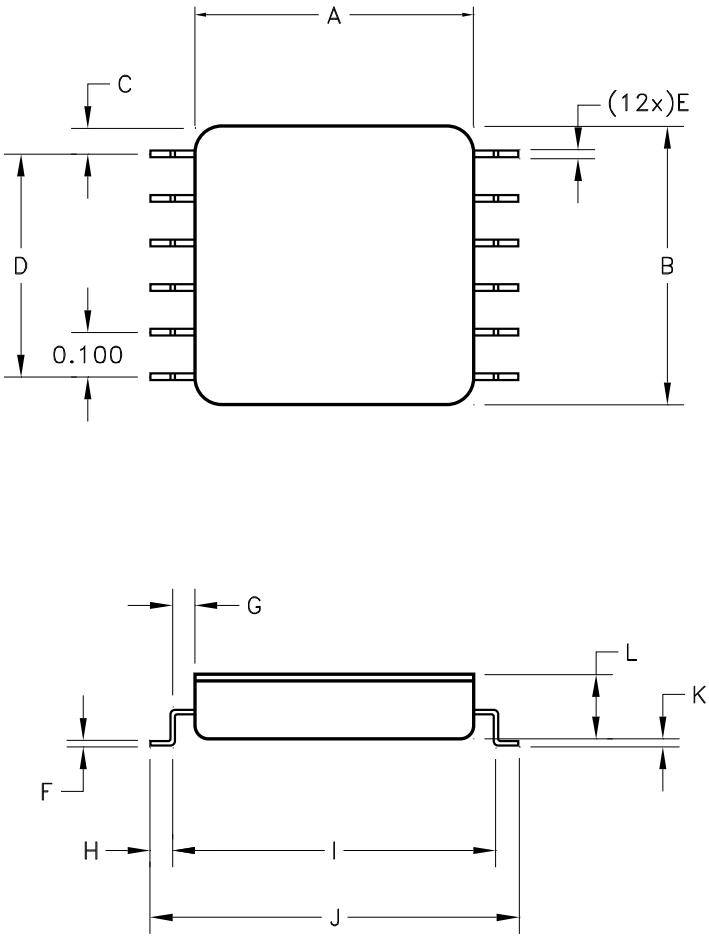








MECHANICAL SPECIFICATIONS



REF	MIN	MAX
A	0.620	0.630
B	0.620	0.630
C	0.0575	0.0675
D	0.495	0.505
E	0.012	0.018
F	0.007	0.013
G	0.045	0.055
H	0.045	0.055
I	0.720	0.730
J	0.820	0.830
K	0.015	0.019
K	0.012	0.018
L	———	0.160

WEIGHT = 3.5 GRAMS TYPICAL

ALL DIMENSIONS ARE ±0.010 INCHES UNLESS OTHERWISE LABELED.
ESD Triangle indicates pin 1.

ORDERING INFORMATION

PART NUMBER	SCREENING LEVEL
MSK5500-15	INDUSTRIAL
MSK5500-15H	MIL-PRF-38534 CLASS H

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