



M.S.KENNEDY CORP.

DUAL POSITIVE/NEGATIVE, 3 AMP, ULTRA LOW DROPOUT FIXED VOLTAGE REGULATORS

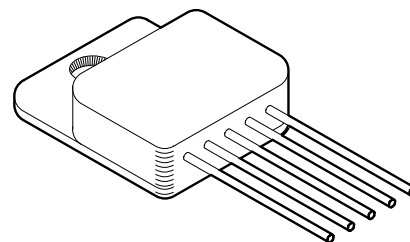
5200 SERIES

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FEATURES:

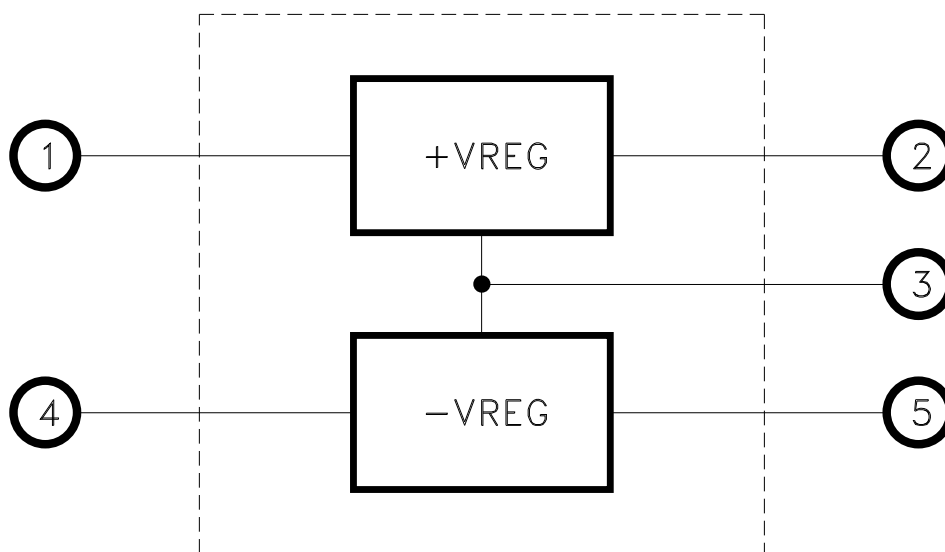
- Ultra Low Dropout Voltage
- Internal Short Circuit Current Limit
- Output Voltages Are Internally Set To $\pm 1\%$ Maximum
- Electrically Isolated Case
- Internal Thermal Overload Protection
- Many Output Voltage Combinations
- Alternate Package and Lead Form Configurations Available



DESCRIPTION:

The MSK 5200 Series offers ultra low dropout voltages on both the positive and negative regulators. This, combined with the low θ_{JC} , allows increased output current while providing exceptional device efficiency. Because of the increased efficiency, a small hermetic 5 pin package can be used providing maximum performance while occupying minimal board space. Output voltages are internally trimmed to $\pm 1\%$ maximum resulting in consistent and accurate operation. Additionally, both regulators offer internal short circuit current and thermal limiting, which allows circuit protection and eliminates the need for external components and excessive derating.

EQUIVALENT SCHEMATIC



TYPICAL APPLICATIONS

- High Efficiency Linear Regulators
- Constant Voltage/Current Regulators
- System Power Supplies
- Switching Power Supply Post Regulators

PIN-OUT INFORMATION

- | | |
|---|--------|
| 1 | + Vin |
| 2 | + Vout |
| 3 | GND |
| 4 | -Vin |
| 5 | -Vout |

ABSOLUTE MAXIMUM RATINGS ^⑫

$\pm V_{IN}$	Input Voltage	$\pm 26V$	T_{ST}	Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$
P_D	Power Dissipation	Internally Limited	T_{LD}	Lead Temperature Range	$300^{\circ}C$ (10 Seconds)
I_{OUT}	Output Current	$\pm 3.0A$	T_C	Case Operating Temperature	MSK5200-5210 $-40^{\circ}C$ to $+125^{\circ}C$ MSK5200H-5210H. $-55^{\circ}C$ to $+125^{\circ}C$
T_J	Junction Temperature.	$+150^{\circ}C$			

ELECTRICAL SPECIFICATIONS

Parameter	Test Conditions ^{① ③}	Group A Subgroup	MSK 5200H SERIES			MSK 5200 SERIES			Units
			Min.	Typ.	Max.	Min.	Typ.	Max.	
POSITIVE OUTPUT REGULATORS:									
Output Voltage Tolerance	$V_{IN} = V_{OUT} + 1V$ $I_{OUT} = 0A$	1	-	0.5	1.0	-	0.5	1.5	%
		2,3	-	1.0	2.0	-	1.0	-	%
Dropout Voltage ^②	$I_{OUT} = 2A$; $\Delta V_{OUT} = -1\%$	1	-	350	600	-	350	625	mV
Load Regulation ^⑩	$100mA \leq I_{OUT} \leq 2.5A$ $V_{IN} = V_{OUT} + 1V$	1	-	0.2	1.0	-	0.2	1.2	%
		2,3	-	0.3	2.0	-	0.3	-	%
Line Regulation	$I_{OUT} = 0A$ $(V_{OUT} + 1V) \leq V_{IN} \leq (26V)$	1	-	0.1	0.5	-	0.1	0.6	%
		2,3	-	0.5	1.0	-	0.5	-	%
Quiescent Current	$V_{IN} = V_{OUT} + 1V$; $I_{OUT} = 0A$	1,2,3	-	10	15	-	10	15	mA
Short Circuit Current ^{② ⑪}	$V_{IN} = V_{OUT} + 1V$	1	-	4.5	5.0	-	4.5	5.0	A
Ripple Rejection ^②	$I_{OUT} = 3A$; $C_{OUT} = 25\mu F$; $f = 120Hz$	4	60	75	-	60	75	-	dB
Thermal Resistance ^②	Junction to Case @ $125^{\circ}C$	-	-	2.5	3.0	-	2.5	3.2	$^{\circ}C/W$
NEGATIVE OUTPUT REGULATORS: ^⑨									
Output Voltage Tolerance	$V_{IN} = V_{OUT} + 1.5V$ $I_{OUT} = 0A$	1	-	0.1	1.0	-	0.1	2.0	%
		2,3	-	0.1	2.0	-	-	-	%
Dropout Voltage ^②	$I_{OUT} = 2A$; $\Delta V_{OUT} = -1\%$	1	-	550	700	-	550	750	mV
Load Regulation ^⑩	$V_{IN} = V_{OUT} + 1.5V$ $100mA \leq I_{OUT} \leq 2.5A$	1	-	0.3	1.5	-	0.3	1.7	%
		2,3	-	0.5	2.5	-	0.5	-	%
Line Regulation	$I_{OUT} = 0A$ $(V_{OUT} + 1.5V) \leq V_{IN} \leq (26V)$	1	-	0.1	0.5	-	0.1	0.6	%
		2,3	-	0.5	1.0	-	0.5	-	%
Quiescent Current	$V_{IN} = V_{OUT} + 1.5V$; $I_{OUT} = 0A$	1,2,3	-	4.5	10	-	4.5	10	mA
Short Circuit Current ^{② ⑪}	$V_{IN} = V_{OUT} + 1.5V$	1	3.0	3.5	-	3.0	3.5	-	A
Ripple Rejection ^②	$I_{OUT} = 3A$; $C_{OUT} = 25\mu F$; $f = 120Hz$	4	60	75	-	60	75	-	dB
Thermal Resistance ^②	Junction to Case @ $125^{\circ}C$	-	-	4.7	5.9	-	4.7	5.9	$^{\circ}C/W$

NOTES:

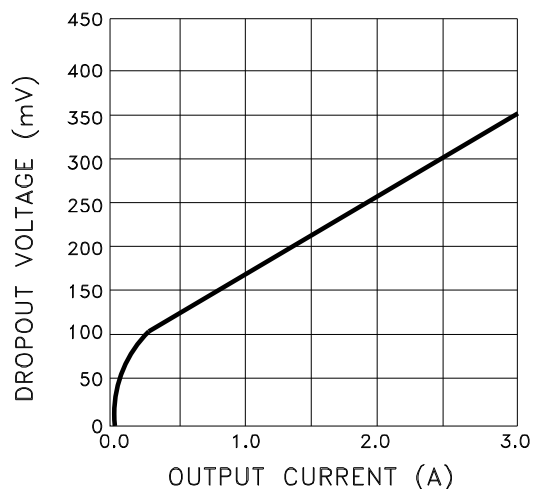
- ① Outputs are decoupled to ground using 33 μF minimum tantalum capacitance unless otherwise specified.
- ② This parameter is guaranteed by design but need not be tested.
Typical parameters are representative of actual device performance but are for reference only.
- ③ All output parameters are tested using a low duty cycle pulse to maintain $T_J = T_C$.
- ④ Industrial grade devices shall be tested to subgroups 1 and 4 unless otherwise specified.
- ⑤ Military grade devices ('H' suffix) shall be 100% tested to subgroups 1,2,3 and 4.
- ⑥ Subgroup 5 and 6 testing available upon request.
- ⑦ Subgroup 1,4 $T_C = +25^{\circ}C$
Subgroup 2,5 $T_J = +125^{\circ}C$
Subgroup 3,6 $T_A = -55^{\circ}C$
- ⑧ Please consult the factory if alternate output voltages are required.
- ⑨ Input voltage ($V_{IN} = V_{OUT} +$ a specified voltage) is implied to be more negative than V_{OUT} .
- ⑩ Due to current limit, maximum output current may not be available at all values of V_{IN} - V_{OUT} and temperatures.
See typical performance curves for clarification.
- ⑪ The output current limit function provides protection from transient overloads but it may exceed the maximum continuous rating.
Continuous operation in current limit may damage the device.
- ⑫ Continuous operation at or above absolute maximum ratings may adversely effect the device performance and/or life cycle.

PART ^⑧ NUMBER	OUTPUT VOLTAGES	
	POSITIVE	NEGATIVE
MSK 5200	+3.3V	-5.2V
MSK 5201	+5.0V	-5.0V
MSK 5202	+5.0V	-5.2V
MSK 5203	+12.0V	-5.0V
MSK 5204	+12.0V	-12.0V
MSK 5205	+15.0V	-15.0V
MSK 5206	+15.0V	-5.0V
MSK 5207	+5.0V	-12.0V
MSK 5208	+5.0V	-15.0V
MSK 5209	+10.0V	-10.0V
MSK 5210	+5.2V	-5.2V

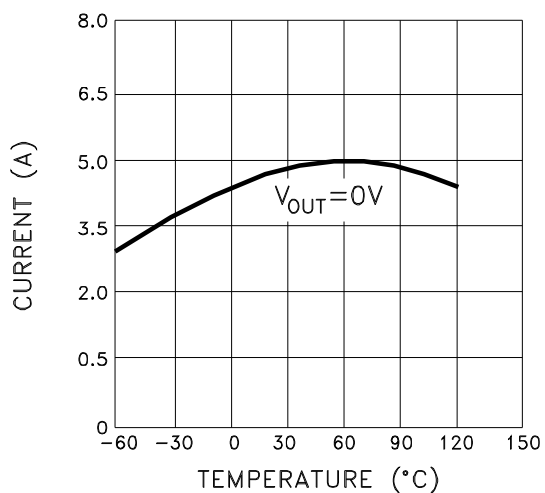
TYPICAL PERFORMANCE CURVES

POSITIVE REGULATORS

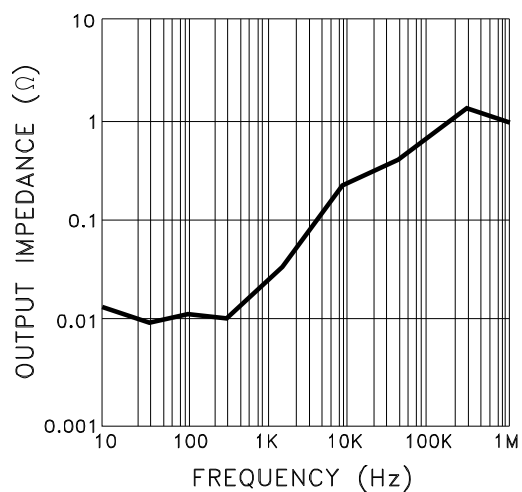
DROPOUT vs OUTPUT CURRENT



SHORT CIRCUIT CURRENT vs. TEMP.

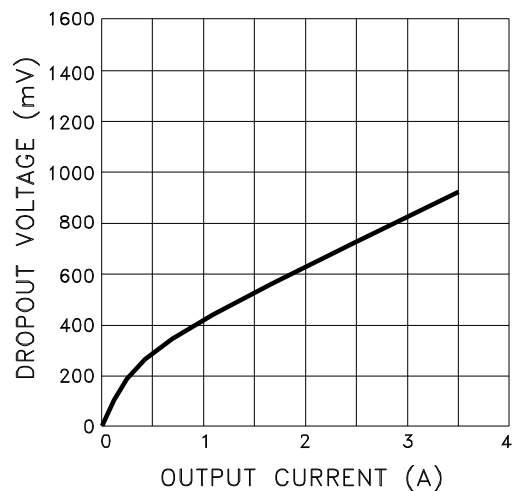


OUTPUT IMPEDANCE vs. FREQUENCY

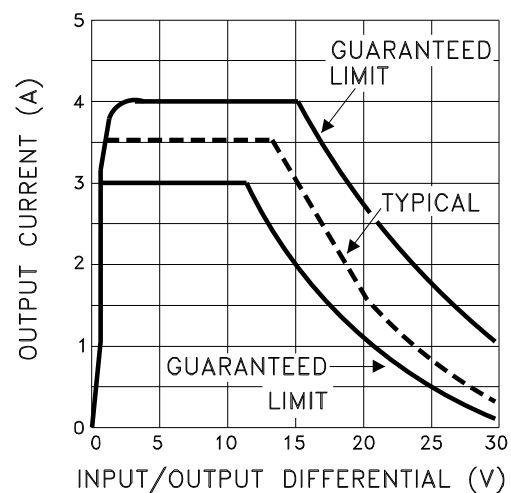


NEGATIVE REGULATORS

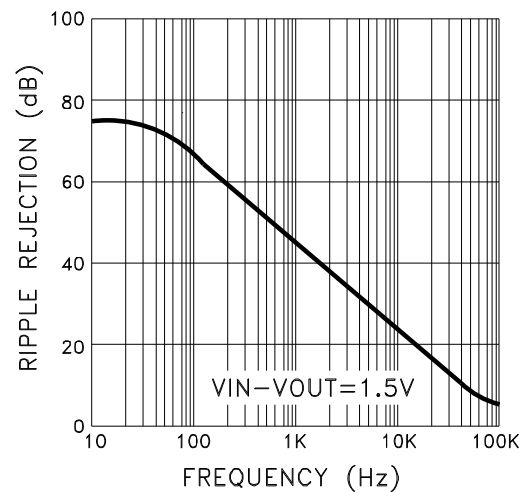
DROPOUT VOLTAGE vs. OUTPUT CURRENT



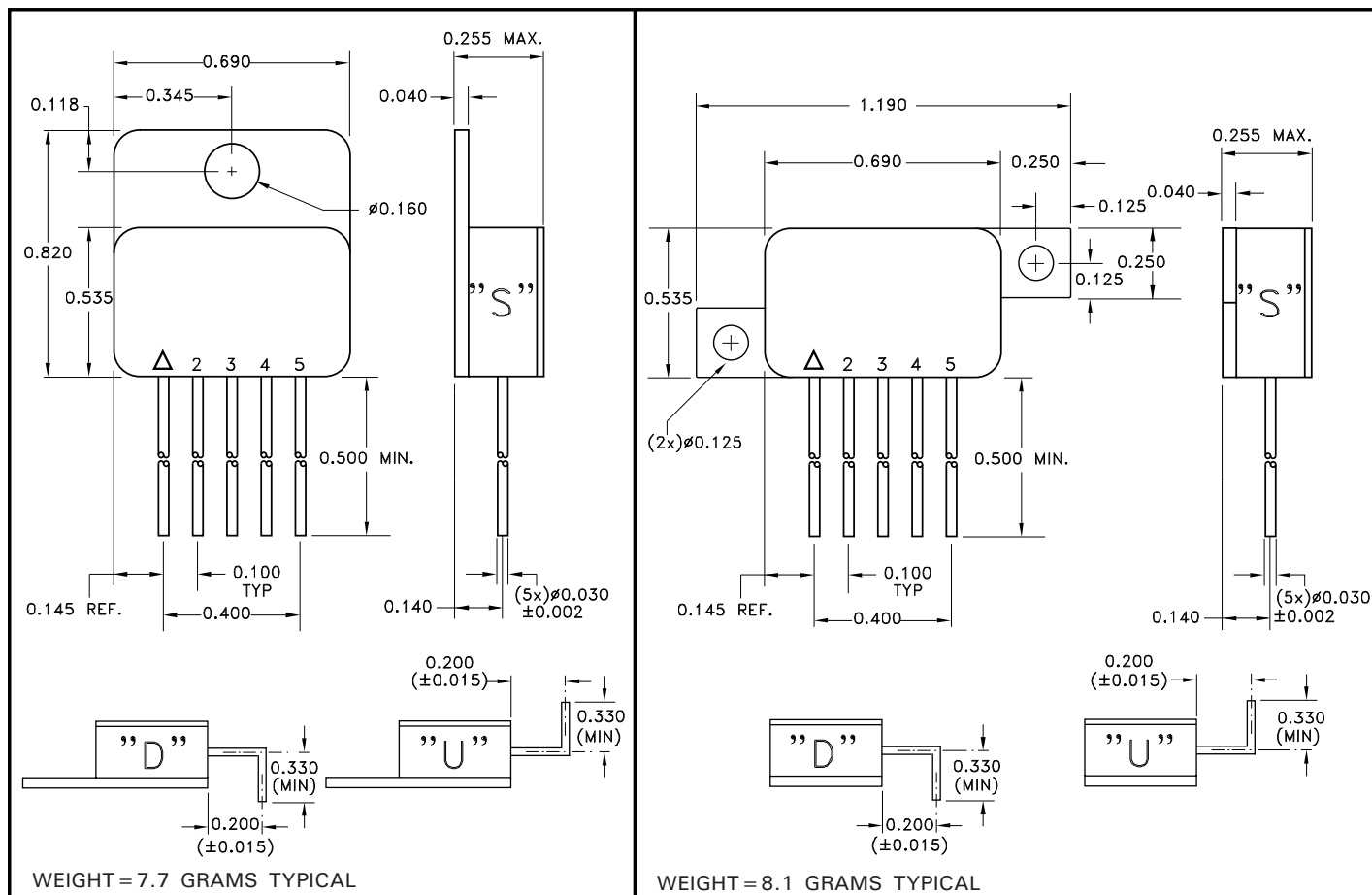
INTERNAL CURRENT LIMIT vs. $V_{IN}-V_{OUT}$



RIPPLE REJECTION vs. FREQUENCY



MECHANICAL SPECIFICATIONS



NOTE: ALL DIMENSIONS ARE ± 0.010 INCHES UNLESS OTHERWISE LABELED.
ESD Triangle indicates Pin 1.

ORDERING INFORMATION

MSK5200- H T U

LEAD CONFIGURATIONS

S = STRAIGHT; U = BENT UP; D = BENT DOWN

PACKAGE STYLE

T = TOP TAB; Z = Z PACK

SCREENING

BLANK = INDUSTRIAL; H = MIL-PRF 38534 CLASS H

GENERAL PART NUMBER

The above example is a dual +3.3V, -5.2V, Military regulator using the top tab package with leads bent up.

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