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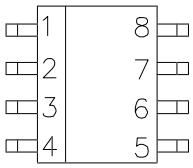
TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The EZ1900 is a high performance positive load current balancer designed for use in applications utilizing 2 regulators in parallel to achieve equal current sharing or identical current for each load. The regulator balance controller allows a flexible motherboard design to be made to cope with different processor configurations. The controller reads a logic level upgrade signal (denoted V_{CC2DET} on the Intel P55C; similar on AMD, Cyrix and PowerPC microprocessors) to control the output voltage of two linear low dropout voltage regulators to the CPU core and I/O planes. In single-voltage plane configurations (V_{CC2DET} floating), both regulators are set to the same output voltage (usually 3.3 - 3.5V) and are configured in master-slave mode. For split plane processors (V_{CC2DET} low), the outputs of the two regulators are switched - the core voltage will be set to a nominal 2.5V while the I/O voltage will remain at 3.3V. The actual output voltages can be adjusted by means of resistors. The EZ1900 programmable current balancer is available in the popular SO-8 surface mount package.

PIN CONFIGURATION



SO-8

Pin #	Legend	Description
1	Sel	Non-slave mode, voltage select
2	-IN	Negative error amplifier input
3	+IN	Positive error amplifier input
4	-V	Power input, common
5	nc	No Connection
6	S_{OUT}	Sets V_{OUT} of slave device
7	+V	Power input, positive
8	nc	No connection

Slave Mode Pin: For non "Computer Select Operation", the Select Mode, pin #1, can be left open circuited for continuous slave mode operation or balance current control. Ground the Select Mode, pin #1, for non-slave mode operation.

FEATURES

- Current balance controller for regulators in parallel
- Slave and non-slave voltage modes
- Slave or non-slave mode computer selected
- Compatible with 3 or 5 pin low drop regulators
- Remote sense operation
- SO-8 package

APPLICATIONS

- Flexible upgrade from single voltage plane to split-plane processors
- Intel Pentium® Processor P54CS & P55C upgrades
- PowerPC™ 603 & 604 upgrades
- $AMD5_K86$™ upgrades

ORDERING INFORMATION

DEVICE(1)	PACKAGE
EZ1900CS	SO-8

Note:
(1) Add suffix 'TR' for tape and reel.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Units
Input Voltage Supply	V_{IN}	7	V
Differential Amplifier	-IN, +IN S_{OUT}	7 0 to +V	V
Slave Output Current (sink only)	I_{SLAVE}	50	mA
Thermal Resistance Junction to Ambient	θ_{JA}	160	°C/W
Operating Junction Temperature Range	T_J	0 to 70	°C
Storage Temperature Range	T_{STG}	-65 to 125	°C
Lead Temperature (Soldering) 5 Sec	T_{LEAD}	260	°C

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ELECTRICAL CHARACTERISTICS

Unless otherwise specified: V_{IN} = 5V; I_{SLAVE} = 10mA; T_J = 25°C.

		Test Conditions			Test Limits			
Parameter	**Symbol**	**+V**	**S_{OUT}**	**T_J**	**Min**	**Typ**	**Max**	**Units**
Input								
Input Error Voltage	V_{IO}						5	mV
Common Mode Input Range	V_{CM}	7V			1		7	V
Average Temperature Coefficient, Input DIFF Voltage	$\frac{\Delta V_{IE}}{\Delta T}$					0.01		mV/°C
Input Current	I_{IC}					50	200	nA
Common Mode Rejection Ratio	CMRR	7V			70	80		dB
Power Supply Rejection Ration	PSRR				60	70		dB
Sensitivity	$\Delta I_{OUT} / \Delta V_{DIFF}$				10	50		℧
Select Threshold Low High	V_{TH}				 2.4		0.8	V
Select Input Current Low SEL = 0V	I_{SEL}					-150	-200	µA
High SEL = 7V							1	
Output								
Slave Output Leakage	S_{OL}		7V				1	µA
Slave Output Resistance	R_O				2	3	4	Ω
Power Supply Current Slave Mode	I_{CC}					500	700	µA
Non-Slave Mode						3	5	mA
Off Mode							700	µA

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V_{OUT}/RESISTOR SELECTION REFERENCE

(Resistor selection in Ω. See Typical Applications on following pages.)

Slave Mode (Master Regulator) V_M

V_{OUT}	R3	R4	Calc V_{OUT}
3.500	130	232	3.494
3.300	115	187	3.293
2.900	133	174	2.895
2.800	137	169	2.801
2.700	137	158	2.700
2.600	121	130	2.600
2.500	115	115	2.506

Notes:
$V_M = V_{REF} (1 + R4 / R3) + I_{ADJ} R4$.
Resistor selection is based upon standard table for 1% resistors.

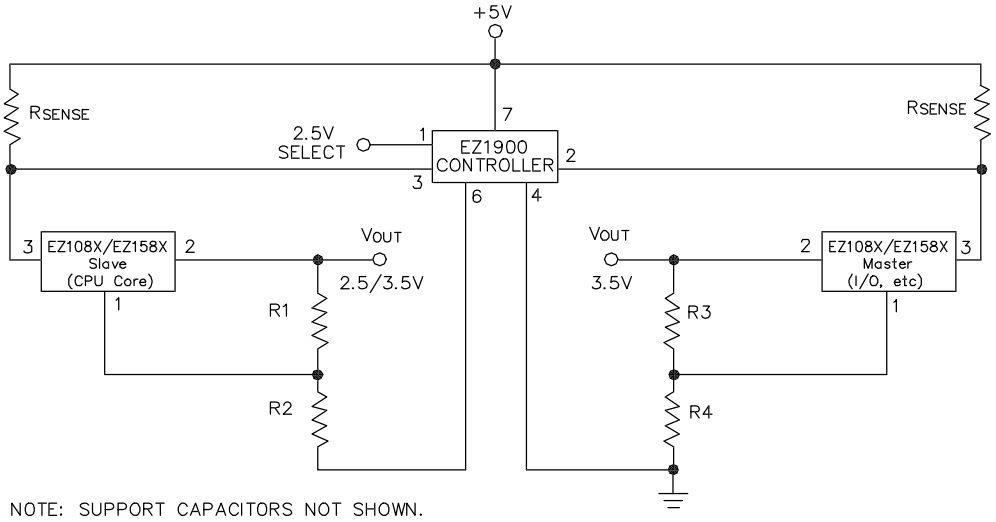
Non-Slave Mode (Slave Regulator) V_S

V_{OUT}	R1	R2	*Calc V_{OUT}
3.500	137	243	3.508
3.300	137	221	3.306
2.900	137	178	2.911
2.800	124	150	2.801
2.700	130	147	2.701
2.600	121	127	2.600
2.500	133	137	2.498

Notes:
$V_S = V_{REF} (1 + (R2 + 3\Omega) / R1) + I_{ADJ} (R2 + 3\Omega)$.
*The EZ1900 operating in the non-slave mode operation will introduce approximately 3 ohms of resistance in the voltage set path when selected. The calculated values are based upon this addition.

TYPICAL APPLICATIONS

Balanced Current Controller Utilizing EZ108X/EZ158X Series



Voltage Select
Slave Mode Operation $V_M = V_{OUT}$ of Master
$V_M = V_{REF} (1 + R4/R3) + I_{ADJ} R4$
Non-Slave Mode, $V_S = V_{OUT}$ of Slave
$V_S = V_{REF} (1 + (R2 + 3\Omega) / R1) + I_{ADJ} (R2 + 3\Omega)$

R_{SENSE} Select
R_{SENSE} Select; Typical selection can be
(50mV to 100mV) / (Total I_{OUT} / 2).
Trace resistance of 10mΩ and above can easily accomodate value required.

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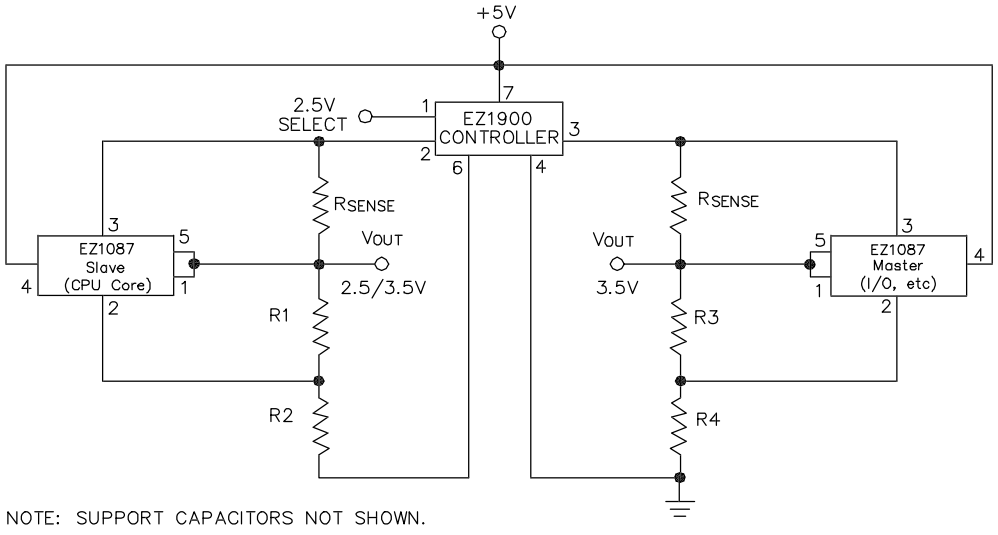
TYPICAL APPLICATIONS (cont.)

Balanced Current Controller Utilizing EZ1087 Series

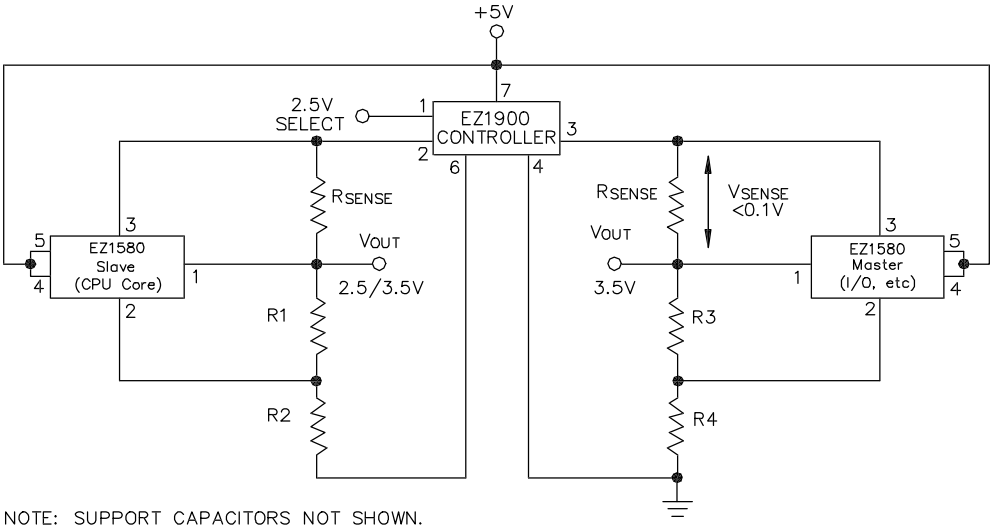


NOTE: SUPPORT CAPACITORS NOT SHOWN.

Voltage Select
Slave Mode Operation $V_M = V_{OUT}$ of Master
$V_M = V_{REF} (1 + R4/R3) + I_{ADJ} R4$
Non-Slave Mode, $V_S = V_{OUT}$ of Slave
$V_S = V_{REF} (1 + (R2 + 3\Omega) / R1) + I_{ADJ} (R2 + 3\Omega)$

R_{SENSE} Select
R_{SENSE} Select; Typical selection can be
(50mV to 100mV) / (Total I_{OUT} / 2).
Trace resistance of 10mΩ and above can easily accomodate value required.

Balanced Current Controller Utilizing EZ1580 Series



NOTE: SUPPORT CAPACITORS NOT SHOWN.

Voltage Select
Slave Mode Operation $V_M = V_{OUT}$ of Master
$V_M = V_{REF} (1 + R4/R3) + I_{ADJ} R4$
Non-Slave Mode, $V_S = V_{OUT}$ of Slave
$V_S = V_{REF} (1 + (R2 + 3\Omega) / R1) + I_{ADJ} (R2 + 3\Omega)$

R_{SENSE} Select
R_{SENSE} Select (100mV Min) / (Total I_{OUT} / 2)
The EZ1580 series requires R_{SENSE} voltage to be less than 100mV.
Trace resistance can easily accomodate value required.

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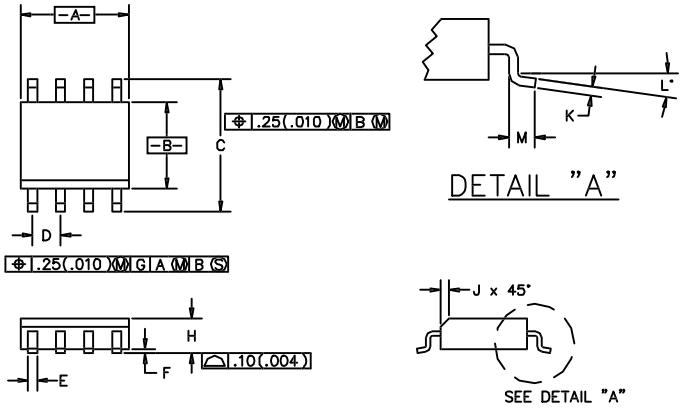
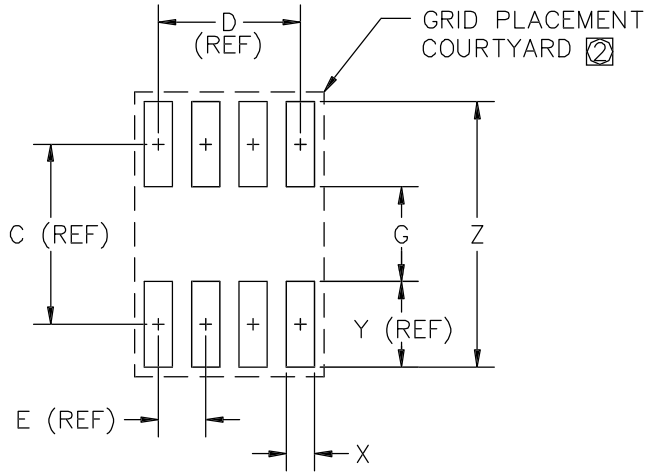
OUTLINE DRAWING SO-8



DIMENSIONS					
DIM^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.188	.197	4.80	5.00	
B	.149	.158	3.80	4.00	
C	.228	.244	5.80	6.20	
D	.050 BSC		1.27 BSC		
E	.013	.020	0.33	0.51	
F	.004	.010	0.10	0.25	
H	.053	.069	1.35	1.75	
J	.011	.019	0.28	0.48	
K	.007	.010	.19	.25	
L	0°	8°	0°	8°	
M	.016	.050	0.40	1.27	

LAND PATTERN SO-8



DIMENSIONS (1)					
DIM^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.19	–	5.00	–
D	–	.15	–	3.81	–
E	–	.05	–	1.27	–
G	.10	.11	2.60	2.80	–
X	.02	.03	.60	.80	–
Y	–	.09	–	2.40	–
Z	–	.29	7.20	7.40	–

(2) GRID PLACEMENT COURTYARD IS 12x16 ELEMENTS (6 mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

(1) CONTROLLING DIMENSION: MILLIMETERS