

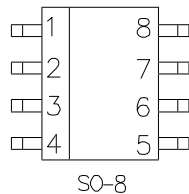
May 27, 1999

 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



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_x86™ 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: $V_{IN} = 5V$; $I_{SLAVE} = 10mA$; $T_J = 25^{\circ}C$.

Parameter	Symbol	Test Conditions			Test Limits			Units
		+V	S _{OUT}	T _J	Min	Typ	Max	
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		Ω
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

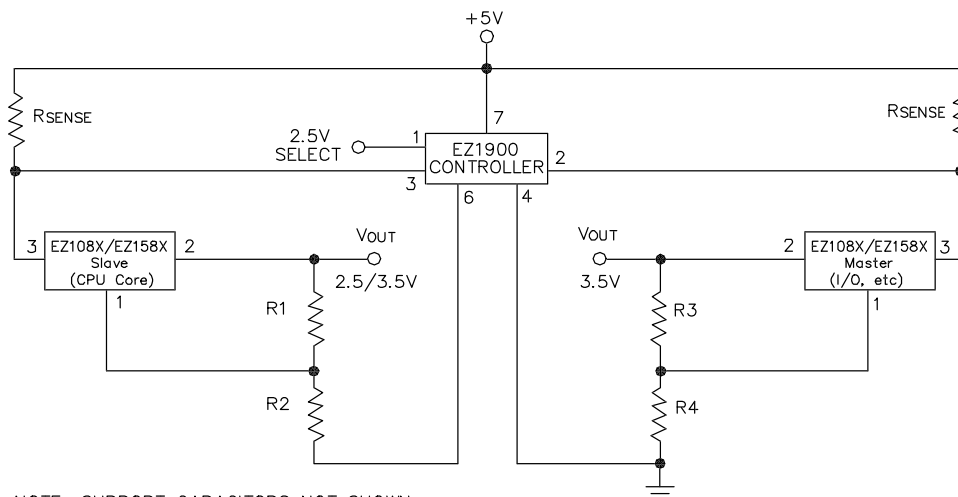
V _{OUT}	R3	R4	Calc V _{OUT}
3.500	130	232	3.494
3.300	115	187	3.293
2.900	133	174	2.895
2.800	137	169	2.801
2.700	137	158	2.700
2.600	121	130	2.600
2.500	115	115	2.506

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


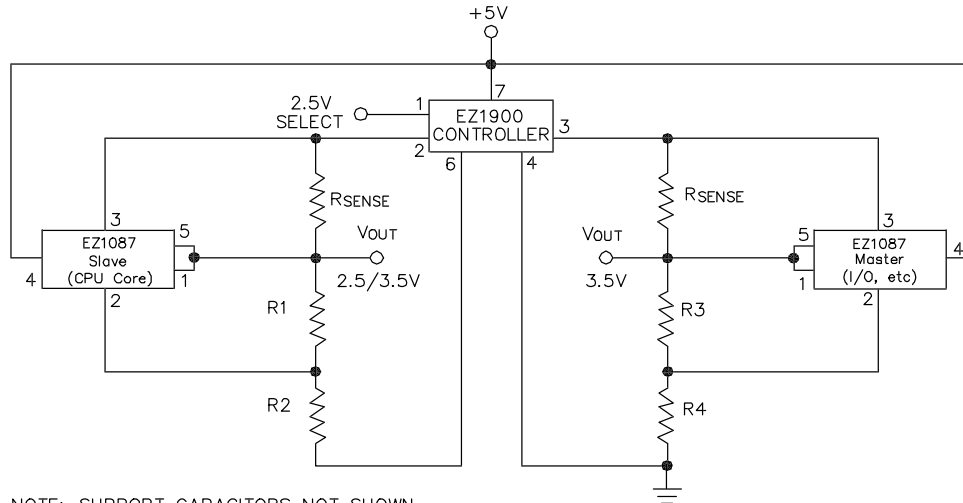
NOTE: SUPPORT CAPACITORS NOT SHOWN.

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 accommodate 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

$$V_M = V_{REF} (1 + R_4/R_3) + I_{ADJ} R_4$$

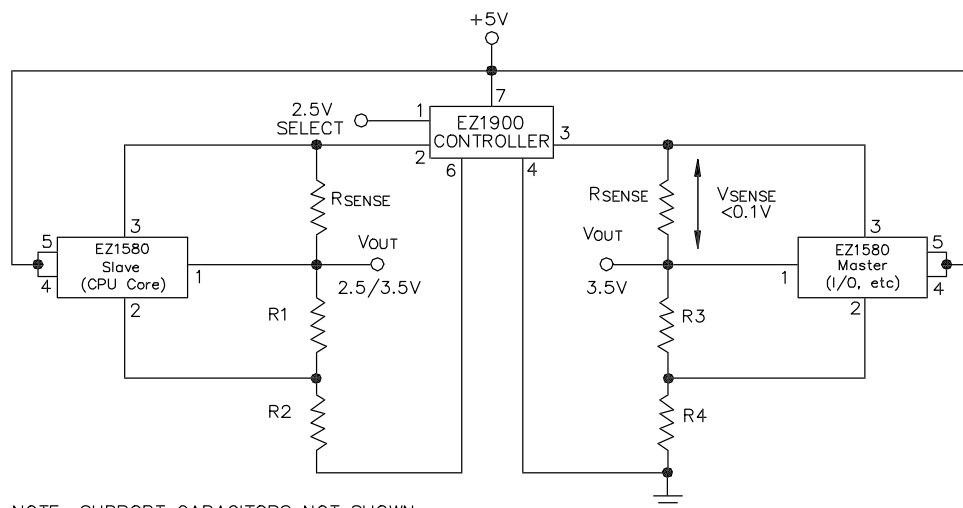
 Non-Slave Mode, $V_S = V_{OUT}$ of Slave

$$V_S = V_{REF} (1 + (R_2 + 3\Omega) / R_1) + I_{ADJ} (R_2 + 3\Omega)$$

 R_{SENSE} Select
 R_{SENSE} Select; Typical selection can be

$$(50\text{mV to } 100\text{mV}) / (\text{Total } I_{OUT} / 2).$$

 Trace resistance of $10\text{m}\Omega$ and above can easily accommodate value required.

Balanced Current Controller Utilizing EZ1580 Series


NOTE: SUPPORT CAPACITORS NOT SHOWN.

Voltage Select

 Slave Mode Operation $V_M = V_{OUT}$ of Master

$$V_M = V_{REF} (1 + R_4/R_3) + I_{ADJ} R_4$$

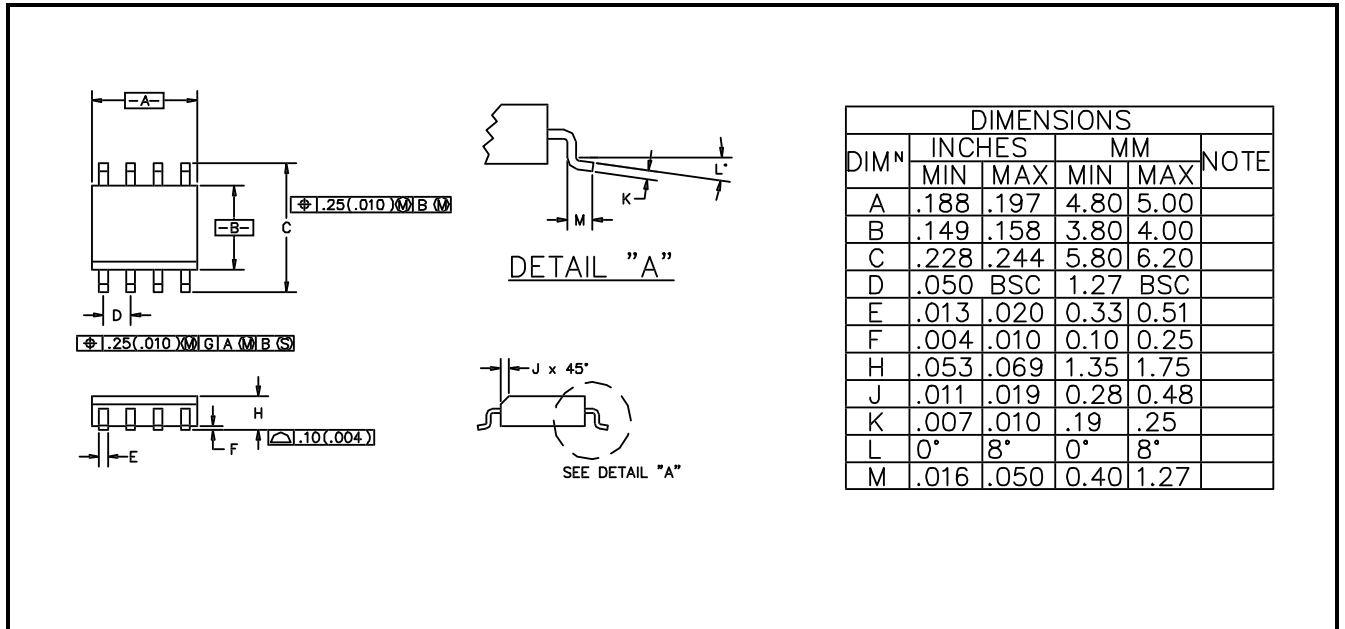
 Non-Slave Mode, $V_S = V_{OUT}$ of Slave

$$V_S = V_{REF} (1 + (R_2 + 3\Omega) / R_1) + I_{ADJ} (R_2 + 3\Omega)$$

 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 accommodate value required.

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OUTLINE DRAWING SO-8

LAND PATTERN SO-8
