

Microcontroller Supervisory Circuit with Open Drain Output

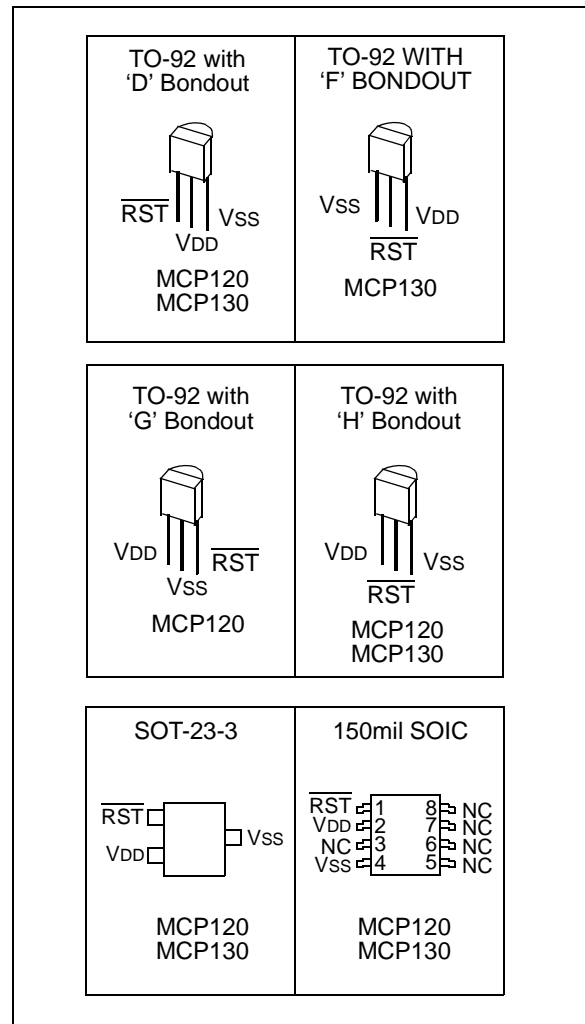
FEATURES

- Holds microcontroller in reset until supply voltage reaches stable operating level
- Resets microcontroller during power loss
- Precision monitoring of 3V, 3.3V and 5V systems
- 7 voltage trip points available
- Active low $\overline{\text{RESET}}$ pin
- Open drain output
- Internal pull-up resistor (5 k Ω) for MCP130
- Holds $\overline{\text{RESET}}$ for 350 ms (typical)
- $\overline{\text{RESET}}$ to $V_{CC} = 1.0V$
- Accuracy of ± 125 mV for 5V systems and ± 75 mV for 3V systems over temperature
- 45 μA typical operating current
- Temperature range:
 - Industrial (I): -40°C to +85°C

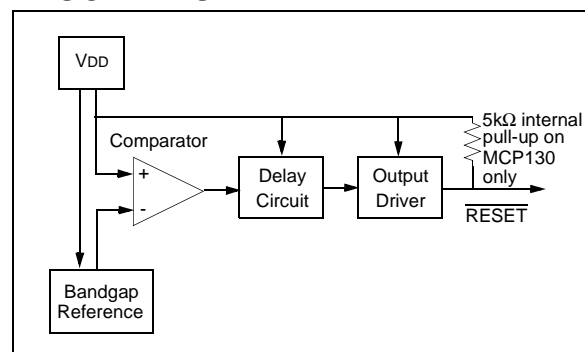
DESCRIPTION

The Microchip Technology Inc. MCP120/130 is a voltage supervisory device designed to keep a microcontroller in reset until the system voltage has reached the proper level and stabilized. It also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level. Both devices are available with a choice of seven different trip voltages and both have open drain outputs. The MCP130 has an internal 5 k Ω pullup resistor. Both devices have active low $\overline{\text{RESET}}$ pins. The MCP120/130 will assert the $\overline{\text{RESET}}$ signal whenever the voltage on the VDD pin is below the trip-point voltage.

PACKAGES



BLOCK DIAGRAM



1.0 ELECTRICAL CHARACTERISTICS

1.1 Maximum Ratings*

VDD..... 7.0V
 All inputs and outputs w.r.t. VSS -0.6V to VDD +1.0V
 Storage temperature -65°C to +150°C
 Ambient temp. with power applied -65°C to +125°C
 ESD protection on all pins ≥ 2 kV

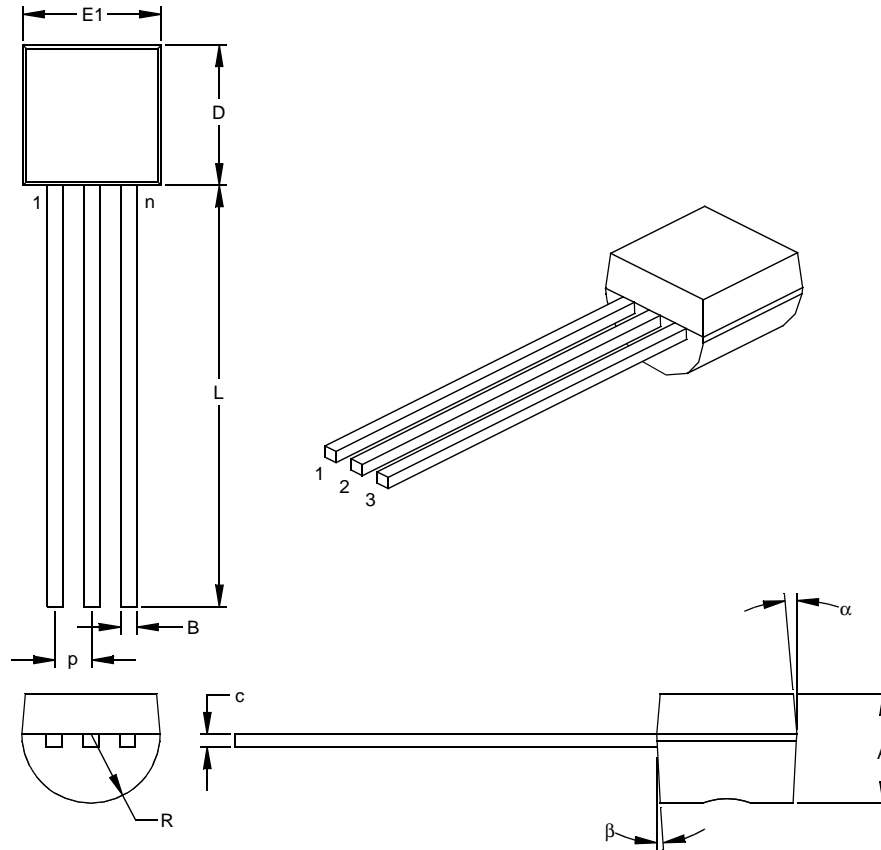
***Notice:** Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC AND AC CHARACTERISTICS

All parameters apply at the specified temp and voltage ranges unless otherwise noted.		VDD = 1.0 - 5.5V Industrial (I): -40°C to +85°C					
Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions	
Operating Voltage Range	VDD	1.0	—	5.5	V		
VDD Value to RESET	VDD _{MIN}	1.0	—	—	V		
Operating Current	IDD	—	45	60	μA	VDD = 5.5V (no load)	
VDD Trip Point	MCP1X0-270 MCP1X0-300 MCP1X0-315 MCP1X0-450 MCP1X0-460 MCP1X0-475 MCP1X0-485	VTRIP	2.55 2.85 3.0 4.25 4.35 4.50 4.60	2.625 2.925 3.075 4.375 4.475 4.625 4.725	2.7 3.0 3.15 4.50 4.60 4.75 4.85	V	
RESET Low Level Output Voltage	MCP1X0-270 MCP1X0-300 MCP1X0-315	VOL	—	—	0.4	V	IOL = 3.2 mA, VDD = VTRIP _{MIN}
	MCP1X0-450 MCP1X0-460 MCP1X0-475 MCP1X0-485		—	—	0.6		IOL = 8.5 mA, VDD = VTRIP _{MIN}
RESET High Level Output Voltage (MCP130 Only)	MCP130-xxx (All VTRIP Points)	VOH	VDD-0.7	—	—	V	IOH = 50 μA, VDD > VTRIP _{MAX}
Pull-up Resistor (MCP130 Only)			—	5	—	kΩ	
Output Leakage (MCP120 Only)			—	1	—	μA	
Threshold Hysteresis	VHYS	—	50	—	—	mV	
VDD Detect to RESET Inactive	trPU	150	350	700	—	ms	
VDD Detect to RESET	trPD	—	10	—	—	μs	VDD ramped from VTRIP _{MAX} + 250 mV down to VTRIP _{MIN} - 250 mV
Note: Typical values are for 25°C and VDD = 5.0V							

3.2 Package Detail Information

3-Lead Plastic Transistor Outline (TO) (TO-92)



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		3			3	
Pitch	p		.050			1.27	
Bottom to Package Flat	A	.130	.143	.155	3.30	3.62	3.94
Overall Width	E1	.175	.186	.195	4.45	4.71	4.95
Overall Length	D	.170	.183	.195	4.32	4.64	4.95
Molded Package Radius	R	.085	.090	.095	2.16	2.29	2.41
Tip to Seating Plane	L	.500	.555	.610	12.70	14.10	15.49
Lead Thickness	c	.014	.017	.020	0.36	0.43	0.51
Lead Width	B	.016	.019	.022	0.41	0.48	0.56
Mold Draft Angle Top	α	4	5	6	4	5	6
Mold Draft Angle Bottom	β	2	3	4	2	3	4

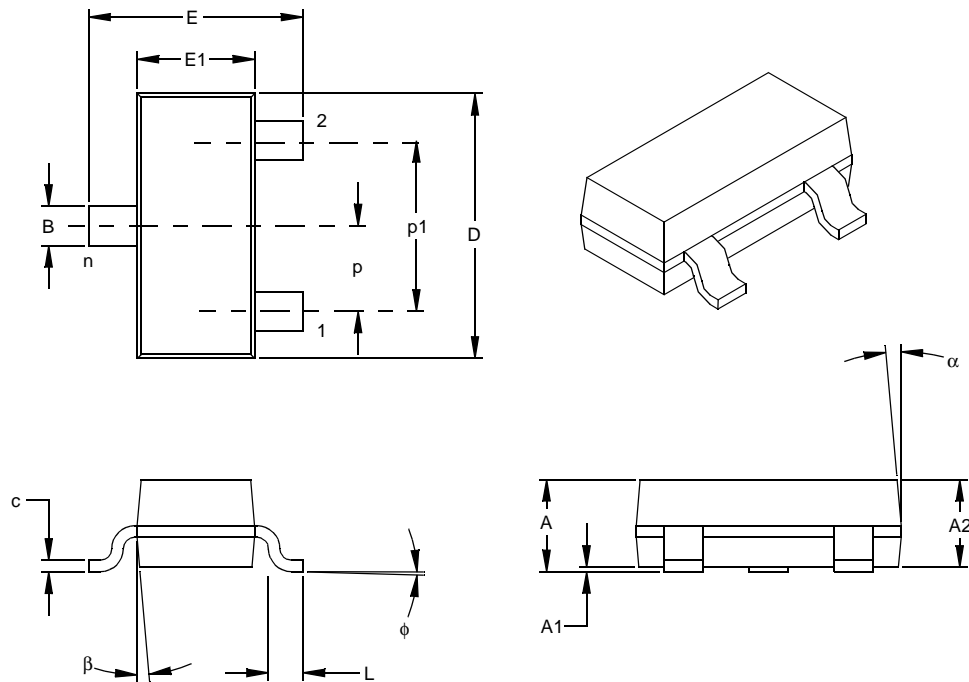
*Controlling Parameter

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.
 JEDEC Equivalent: TO-92
 Drawing No. C04-101

MCP120/130

3-Lead Plastic Small Outline Transistor (TT) (SOT23)



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		3			3	
Pitch	p		.038			0.96	
Outside lead pitch (basic)	p1		.076			1.92	
Overall Height	A	.035	.040	.044	0.89	1.01	1.12
Molded Package Thickness	A2	.035	.037	.040	0.88	0.95	1.02
Standoff §	A1	.000	.002	.004	0.01	0.06	0.10
Overall Width	E	.083	.093	.104	2.10	2.37	2.64
Molded Package Width	E1	.047	.051	.055	1.20	1.30	1.40
Overall Length	D	.110	.115	.120	2.80	2.92	3.04
Foot Length	L	.014	.018	.022	0.35	0.45	0.55
Foot Angle	φ	0	5	10	0	5	10
Lead Thickness	c	.004	.006	.007	0.09	0.14	0.18
Lead Width	B	.015	.017	.020	0.37	0.44	0.51
Mold Draft Angle Top	α	0	5	10	0	5	10
Mold Draft Angle Bottom	β	0	5	10	0	5	10

* Controlling Parameter

§ Significant Characteristic

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.

JEDEC Equivalent: TO-236

Drawing No. C04-104

MCP120/130

PRODUCT IDENTIFICATION SYSTEM

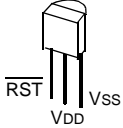
To order or to obtain information (e.g., on pricing or delivery), please refer to the factory or the listed sales offices.

<u>PART NO.</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>/XX</u>
Device	RESET/ RESET VTRIP Voltage	Bondout Option	Temperature Range	Package
Device:	MCP120: Supervisor circuit with open drain output			
	MCP120T: Supervisor circuit with open drain output (tape & reel)			
	MCP130: Supervisor circuit with open drain output and internal pull-up resistor			
	MCP130T: Supervisor circuit with open drain output and internal pull-up resistor (tape & reel)			
RESET/RESET VTRIP Voltage	270 =	$2.55 \leq V_{TRIP} \leq 2.70$		
	300 =	$2.85 \leq V_{TRIP} \leq 3.00$		
	315 =	$3.00 \leq V_{TRIP} \leq 3.15$		
	450 =	$4.25 \leq V_{TRIP} \leq 4.50$		
	460 =	$4.35 \leq V_{TRIP} \leq 4.60$		
	475 =	$4.50 \leq V_{TRIP} \leq 4.75$		
	485 =	$4.60 \leq V_{TRIP} \leq 4.85$		
Bondout Option: (TO-92 Only)	D =	D Bond Option (see bond option chart)		
	F =	F Bond Option		
	G =	G Bond Option		
	H =	H Bond Option		
Temperature Range:	I =	-40°C to +85°C (only offered in I)		
Package:	SN =	SOIC (8-lead, 150 mil body)		
	TO =	TO-92 (3-lead) [offered in bags only]		
	TT =	SOT-23 (3-lead) [offered in tape & reel only]		

Examples:

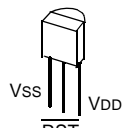
- MCP120-270I/SN = VTRIP range of 2.55V - 2.70V, Industrial Temp., SOIC package
- MCP120-300DI/TO = VTRIP range of 2.85V - 3.00V, Bonding Option D, Industrial Temp., TO-92 package
- MCP120T-315I/TT = VTRIP range of 3.00V - 3.15V, Industrial Temp., SOT-23 package
- MCP130-450I/SN = VTRIP range of 4.25V - 4.50V, Industrial Temp., SOIC package
- MCP130-460FI/TO = VTRIP range of 4.35V - 4.60V, Bonding Option F, Industrial Temp., TO-92 package
- MCP130T-475I/TT = Tape & Reel, VTRIP range of 4.50V - 4.75V, Industrial Temp., SOT-23 package

TO-92 with
'D' Bondout



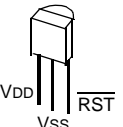
MCP120
MCP130

TO-92 with
'F' Bondout



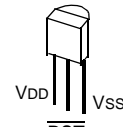
MCP130

TO-92 with
'G' Bondout



MCP120

TO-92 with
'H' Bondout



MCP120
MCP130