

53514 NON-LATCHING, ISOLATED OUTPUT SOLID STATE POWER CONTROLLERS



MICROCIRCUITS

Features:

- Switch Status Output
- I²T circuit protection with status output
- SPST, normally open
- 20A Operating Current
- Power FET output with Low on-state resistance
- Full military temperature operation: -55°C to +125°C.
- Radiation hardened capable.
- Military environmental screening available

Applications:

- Designed for 24V bus applications
- Aircraft Power Distribution
- Military/High Reliability Systems
- Satellite/Space Systems

DESCRIPTION

The 53514 Solid-State Power Controllers are lightweight, resistant to damage from shock and vibration, and immune to contact-related problems (contamination, arcing) associated with mechanical equivalents. They share the heritage and features of the 53504 Solid State Controller family.

Transformer coupling between the input, output and Power Bus stages provides effective isolation of 500 V RMS. The Power FET output eliminates bipolar offset and minimizes output voltage drop.

The Control input is CMOS or TTL logic compatible and may operate from a bias supply of 4.5 to 5.5VDC. (See Figure 1)

Short-circuit protection and I²T trip and output status is provided. The output current is continuously monitored and responds to an over-current condition with an I²T trip curve by opening the output. Over-current conditions include Over-Load and Shorted Output during Turn-On. An open-collector Fault Status or Output Status (optional) is available to indicate the fault or switch state. The output remains blocked until the short is removed and the unit reset. This feature prevents damage to the controller while averting further system failures that may be caused by the short circuit. Standard Output Fault is an Active Low output remaining high (open) under all operating conditions except during an Output Fault. The optional Output Status is High when the output is On and Low when the output is Off. Resetting the unit is accomplished by recycling the input control.

These devices contain radiation hardened components and/or other features that provide a level of radiation tolerance. Micropac does not guarantee any level of radiation hardness. Specific lot testing is required to determine the level of radiation hardness. Micropac does not offer this device as compliant to Appendix G (RHA Requirements) of MIL-PRF-38534.

ABSOLUTE MAXIMUM RATINGS

Isolation voltage ¹	500 V RMS
Output withstanding and transient output voltage ²	100 VDC
Load Current	Less Than 8 Times Rated Operating Current / Self Limiting
Bias supply voltage, V _{DD}	-0.6 to 5.5 VDC
Control Voltage	1 Volt above V _{DD} / Volt below Return
Operating temperature	-55°C to +125°C Case
Storage temperature	-55°C to +125°C

Notes:

¹ 60 Hz sine wave

² Reversing polarity on the output may cause permanent damage

³ Device rating. Application derating not included in these values

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ELECTRICAL CHARACTERISTICS

 $T_A = -55$ to 125°C

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input characteristics					
CMOS configurations (Figure 1)					
Bias supply range, V_{DD}		4.5	5.0	5.5	VDC
Bias current			16	25	mA
Input current	5 VDC Input			500	μA
Control voltage range		-0.5		6.0	VDC
Turn-on voltage (Notes 1, 2)			2.8	3.2	VDC
Turn-off voltage (Notes 1, 2)		0.5	2.7		VDC
Dielectric strength	60 Hz / Input / output / Power Bias/ Case	500			V RMS
Output characteristics (Note 3)					
Output current, sustaining:	Steady state load Current	120		160	%
Load Start current (not externally adjustable)	100ms output on time	500		900	%
Output Pass Current adjustment range:	10 seconds	50			% of Initial
Continuous blocking voltage	Output device Rating			95	VDC
On-state resistance, R_{ds}	25°C Case			10	m Ohms
On-state resistance, R_{ds}	125°C Case			15	m Ohms
Turn-on time @ 25°C case	Figure 2	.5		2.0	mS
Turn-off time @ 25°C case	Figure 2	.5	1.0	2.0	mS
Off-state leakage	At 95 VDC		200	480	μA
Output Capacitance			4,000		pF
Status Output Specification					
Trip Reset Time	Remove overload & Cycle input	50			mS
Status Supply Voltage (open Collector)				32	VDC
Status off leakage current	$V_S = 15$ VDC			4	μADC
Status on voltage	$I_{STATUS} = 5$ MA @ 25°C			0.4	VDC
High-To-Low Transition Time	$I_{STATUS} = 5$ MA		20	50	μS
Junction temperature					
Thermal resistance, θ_{JA}				30	$^\circ\text{C/W}$
Thermal resistance, θ_{JC}				5	$^\circ\text{C/W}$

APPLICATION NOTES:

1. Maximum input switching frequency not to exceed 1 Hz under normal conditions, or into a shorted output.
2. Input transitions should be "bounceless contact" with transitions of <1 ms.
3. System transient suppression must be used to limit switching and fault turn-off current & voltage transients to unit ratings.

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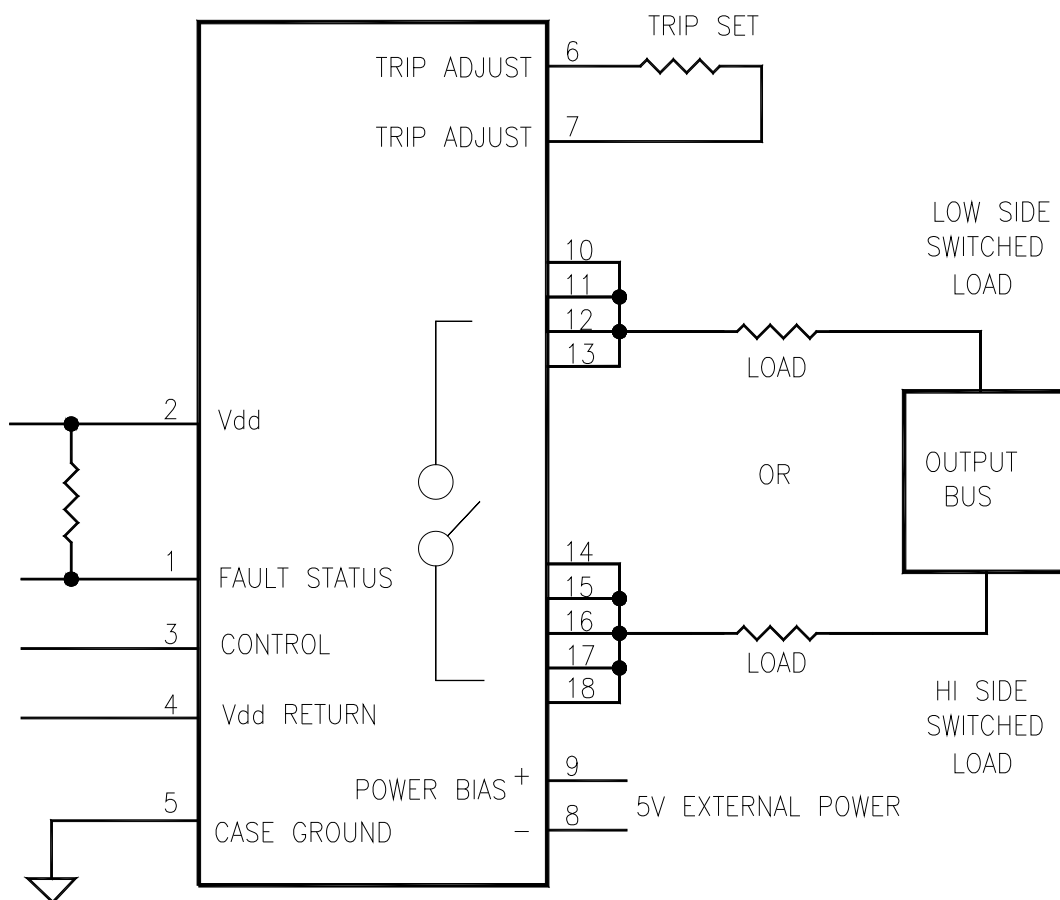


FIGURE 1

High or Low side isolated switch connection. Full isolation exists between Input Logic and status, Output Switch connects, Power Bias and Case.

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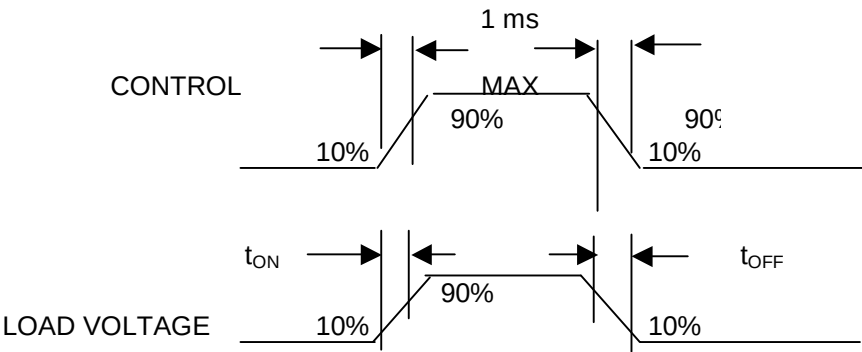


Figure 2 Switching Characteristics

	Turn on into Short Sequence					Short while on Sequence				
Control	0	1	1	0	1	1	1	1	0	1
I out	Off	Off	Off	Off	On	On	Off	Off	Off	On
Output Status	0	0	0	0	Open "1"	Open "1"	0	0	0	Open "1"
Shorted Output	Shorted	Shorted	X	Off	Off	Off	On	X	X	Off

Truth Table – Short circuit and Status

- Note 1: Unit Powers up in the Off condition with application of either Bus power and or V_{DD} .
- Note 2: Fault Status reports only when V_{DD} is present.
- Note 3: An Off Control to On Control transition is required to first turn the Unit On.
- Note 4: Loss of V_{DD} will return the output state to OFF.
- Note 5: Truth Table Power sequencing: Output Status open collector pull-up resistor is assigned a separate and always present voltage, producing a "1" when "Open".

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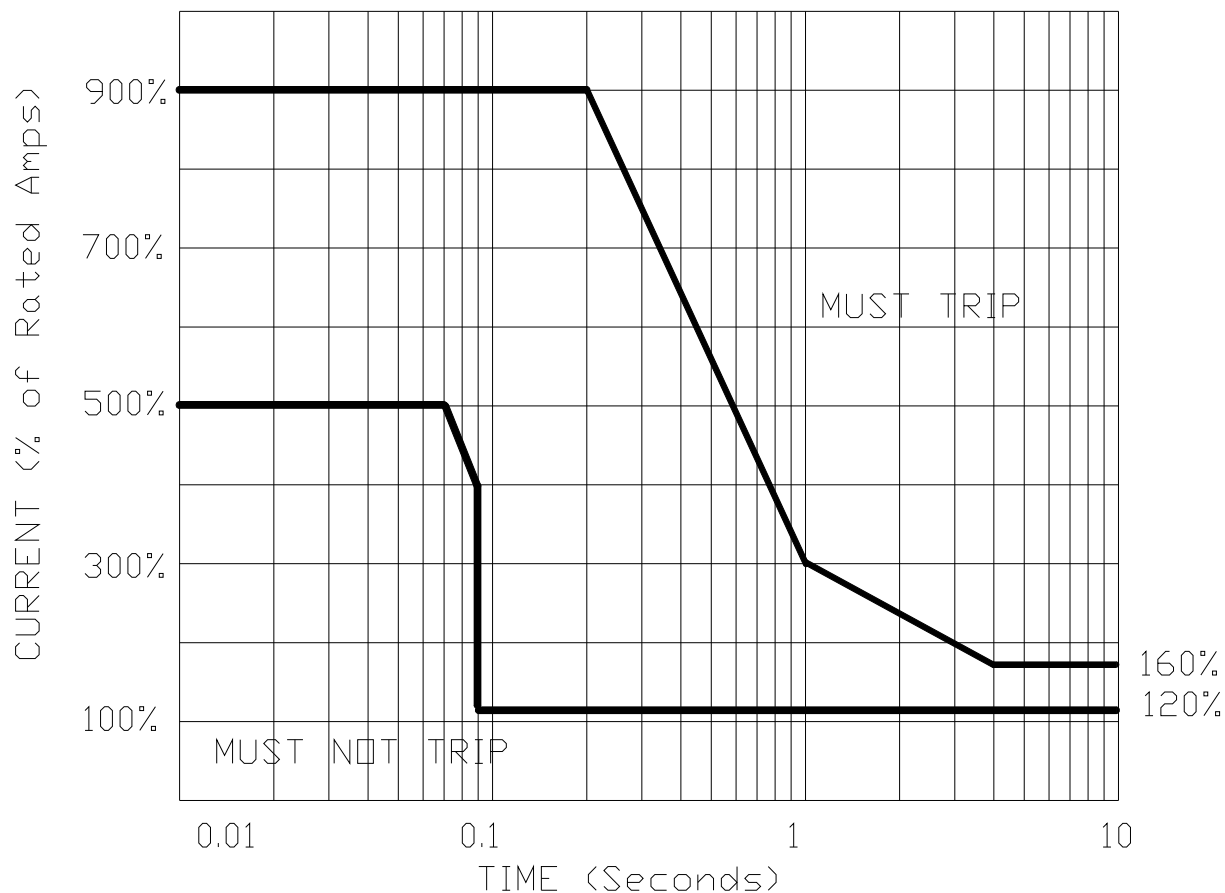
CAGE CODE
 PIN 1 INDICATOR
 .200
 .125 16X
 MFG LOGO
 2.500
 2.117
 Ø.133 2X
 31757
 53514-XXX-XX-XX
 XXXX (DATE CODE)
 USA (XXXX)
 SERIAL NO.
 2.367
 .210 MAX.
 Ø.050 18X
 1.510
 1.260
 .200
 .108 TYP
 .040

IN	FUNCTION
1	FAULT STATUS
2	V_{DD}
3	CONTROL
4	CONTROL RETURN
5	CASE GROUND
6, 7	TRIP CURRENT ADJUST
8	POWER BIAS RETURN
9	POWER BIAS
10, 11, 12, 13	+ BUS
14,15, 16,17 18	OUTPUT

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NOTES:

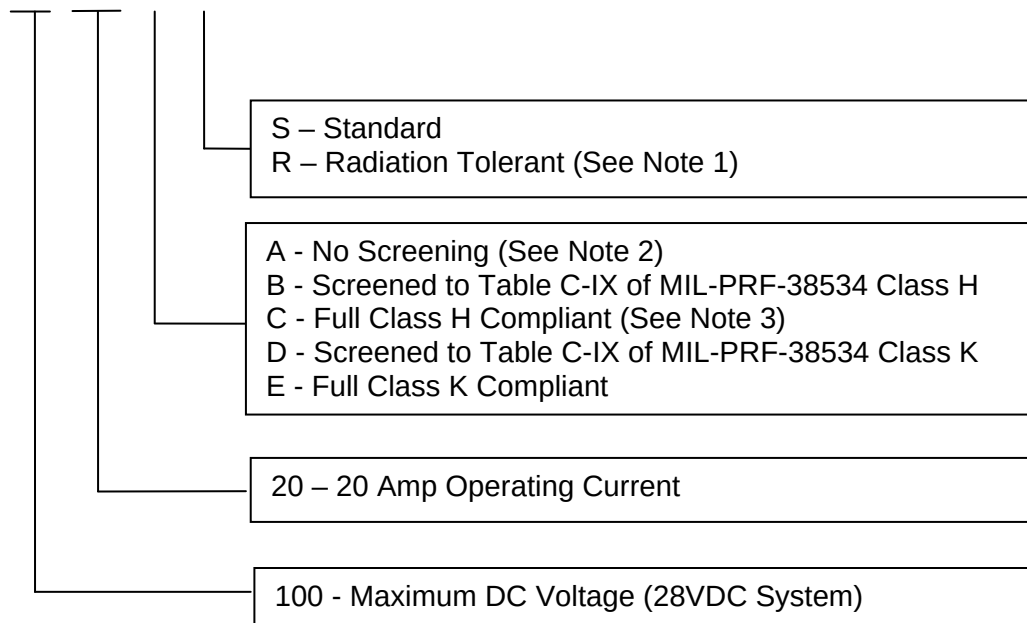
- 1) Initial current limits, NO TRIP and MUST TRIP, will be 500% and 900%, respectively above the rated operating current.
- 2) Minimum output current (sustaining) is 120% of Device Rating.
- 3) Maximum output current (sustaining) is 160% of Device Rating.
- 4) Shorted while On from any On operating condition can have a μ s surge current of up to 1000A.



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Ordering Information:

53514-XXX-XX-XX



NOTES:

1. The device contains radiation hardened components and/or other features that provide a level of radiation tolerance. Micropac does not guarantee any level of radiation hardness. Specific lot testing is required to determine the level of radiation hardness. Micropac does not offer this device as compliant to Appendix G (RHA Requirements) of MIL-PRF-38534.
2. Devices are electrically tested at -55°C, +25°C and +125°C with no environmental screening or qualification.
3. Fully compliant Class H or Class K devices will require Element Evaluation and QCI.

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