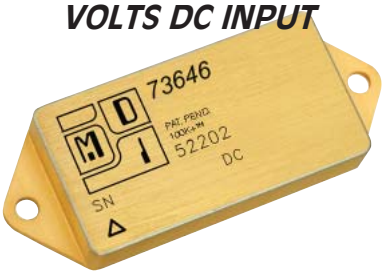
PROGRAMMABLE MAG LATCH INRUSH LIMITER

PROTON RAD HARD 100K+® TECHNOLOGY

28, 50, 70, 100, 120 VOLTS DC INPUT



Series *3646

MODEL	INPUT VOLTAGE
53646	28 VDC (18 - 50 VDC)
73646	50 VDC (30 - 75 VDC)
83646	70 VDC (55 - 90 VDC)
93646	100 VDC (80 - 120 VDC)
33646	120 VDC (86 - 158 VDC)

Series Features

- Duplicates Mag Latch Relay function. All solid state construction
- Rad Hard: TID > 100kRad(Si)
- 2:1 margin: Operates beyond 200kRad TID
- No SEE:LET > 82MeV*cm^2/mg
- Proton Resistant: No optocouplers used
- "Coils" reverse polarity protected
- Overall inrush limiter for downstream converters
- Effectively controls the power input and manages peak inrush current when series connected ahead of downstream DC-DC converters.
- Sequences the inhibit of downstream DC-DC converters until their inputs are fully charged and the power bus has achieved steady state range.
- Programmable current limit permits customizing the output ramp to user preference and system requirements.
- Precision constant current output, stable with temperature, bus voltage and radiation
- Undervoltage Lockout
- Thermal mass for output FET to integrate turn on thermal pulse
- Serves single or multiple converters.

Specifications 73646

INPUT VOLTAGE RANGE:
- No damage: -0.6 VDC to 100 VDC
- Operational: 30 VDC to 75 VDC

I/O RESISTANCE:
- Maximum: 25°C 0.15 ohms
- Typical: 25°C 0.1 ohms

Output current 4A nominal (with out external trim)

Ramp Rate, 80µF external capacatance, nominal, 25°C: 50 volts/millisecond

Isolation, "Coil" to output 500VDC

Actuation voltage 4 < v < 18

"Coil" delay 3ms typical

Recommended pulse 50ms

Quiescent current, nominal at 50 VDC input: 11mA

Undervoltage lockout turn on trip point:
- Turn on (Maximum): 32 VDC
- Turn off (Minimum): 27 VDC
- Turn on: (Nominal): 31 VDC
- Turn off: (Nominal): 28.5 VDC

Enable not pin open circuit voltage: 5 VDC

Enable pin short circuit current: 100 microamperes

Output inhibit pin open circuit voltage withstand 60 VDC

Output inhibit pin short circuit current withstand: 10 mA

CASE TEMPERATURE RANGE:
- Storage: -65°C to 150°C
- Operating: -55°C to 125°C (SE)

WEIGHT: 45 grams maximum

*3646 Theory of Operation

The inrush limiter is a constant current limited FET high side switch.

The switch is commanded on and off by pulses fed into magnetically isolated set and reset two terminal ports, similar to a magnetically latched relay. The switch is initially latched in the off state when input power is applied to the inrush limiter. A nominal 3 mS time delay is incorporated in the magnetic isolators to provide noise immunity. The set and reset coils are reverse polarity protected and operate from 4 VDC to 18 VDC pulses.

A non-isolated inhibit line (referenced to the power return) is also provided, and over-rides the latch function.

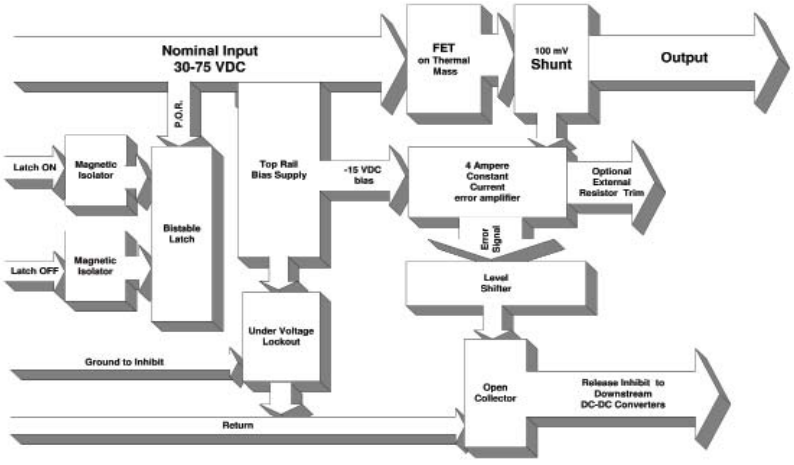
The nominal output current limit is 4 amperes, and can be externally adjusted downward. When driving downstream DC-DC converters with EMI filters, (or other capacitive loads) the constant current output results in a linear ramp up voltage.

The current limiting FET is mounted on a thermal mass, which integrates the effect of the power dissipated during the turn on interval.

The output rate of voltage rise, untrimmed, (dV/dT) is equal to 4A divided by the load capacitance. When externally trimmed for lower currents, the rise time increases accordingly. Output current is sensed by a 100 mV shunt in the positive leg. The signal across the shunt is fed to a high side referenced error amplifier. In turn, the error amplifier drives a power FET in the linear mode. Due to the loop gain of the constant current amplifier, the constant output current limit is largely invariant to line, load, temperature, radiation and ageing.

Interlock with downstream converters is provided so that the downstream converters are inhibited until the inrush is completed. This allows the FET switch to saturate before the downstream converters go active. When the FET switch saturates, and the inrush interval is complete, a ground referenced line is de-asserted, allowing down-stream converters to come on.

An Undervoltage Lockout is provided so that the output will not start until the minimum bus voltage is reached. This function has a small hysteresis to prevent chatter.



Specifications subject to change.

GRADE LEVELS:

Please specify GRADE LEVEL for your application. EU grade units will be shipped if no option is specified.

EU	Engineering Units
R	100 K+™, +85°C military/aerospace
RE	100 K+™, +125°C military/aerospace
S	100 K+™, +85°C space
SE	100 K+™, +125°C space

™

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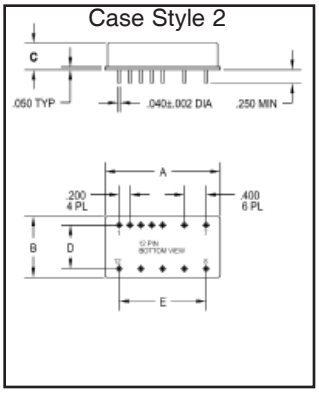
PROGRAMMABLE MAG LATCH INRUSH LIMITER

TABLE 1: Mag Latch Inrush Limiter Ratings and Characteristics. 25C

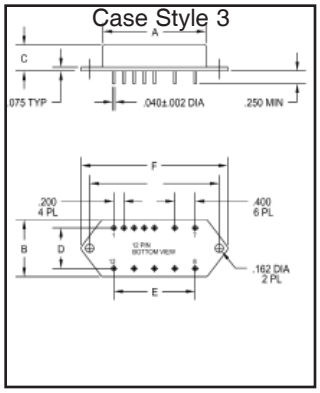
Model Number	Application Bus Voltage	Application. Input Voltage Range	Max. Recommended Input Voltage	Absolute Max. Input Range	Current Limit	Undervoltage Lockout	Initial On Time	Leakage Currnet at Max Recommended Input Voltage	Voltage Drop at Rated Current	Quiescent Current at Nominal Input	"Coil" Voltage	"Coil" Current	Pulse Width	Delay to Activate / Deactivate
	VDC	VDC	VDC	VDC	A	V	µSec	µA	V	mA	VDC	mA	mSec	mSec
33646	120	86 - 158	158	-0.6 - 250	1.5	80	500	20	1	15	4 - 18	20	50	3
93646	100	80 - 120	120	-0.6 - 200	1.5	75	500	20	1	15	4 - 18	20	50	3
83646	70	55 - 90	120	-0.6 - 200	1.5	55	350	20	1	15	4 - 18	20	50	3
73646	50	30 - 75	75	-0.6 - 100	4	28	250	200	0.5	15	4 - 18	20	50	3
53646	28	18 - 50	75	-0.6 - 100	4	20	250	200	0.5	15	4 - 18	20	50	3

- Application Bus Voltage in the commonly available satellite bus voltage ranges. These ratings harmonize with the input voltage ranges for MDI 5000, 7000, 8000 and 9000 series converters. Model 33646 designed for International Space Station and Orion MPCV applications.
- Maximum Recommended Input Voltage is the maximum factory recommendation considering single event radiation effects.
- Absolute Maximum Input Range - No damage.
- Current Limit - Maximum limit current.
- Undervoltage Lockout - minimum nominal value.
- Initial On Time - Typical values, via Inhibit Input release.
- Leakage Current at Max Recommended Input Voltage OFF State - Typical values.
- Volt Drop - Maximum values at limit current.
- Quiescent Current at Nominal Input - Typical values, inhibited OFF.
- "Coil" voltage, current, pulse width, typical values - to command LATCH ON, LATCH OFF functions.
- Delay to Activate/Deactivate - typical values from pulse input to switch function.

Case Style 2



Case Style 3



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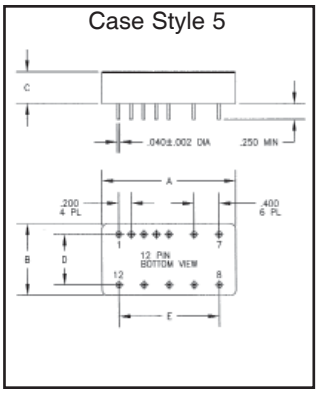

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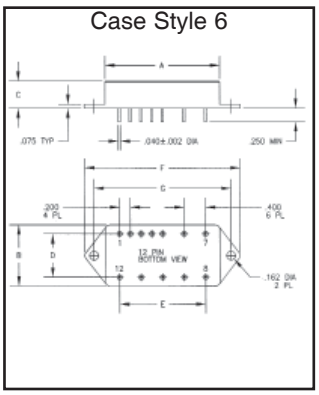
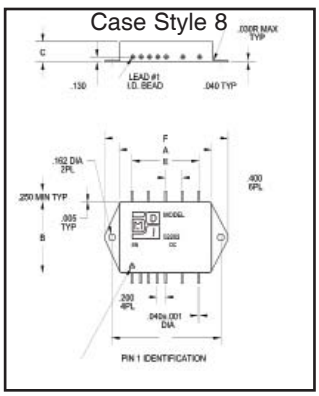
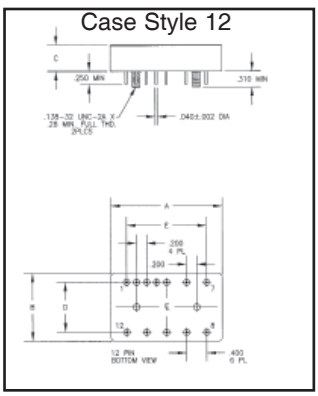


Case Style 8



Case Style 12



Pin Out Chart			
Pin 1	Latch (Coil +)	Pin 7	Inhibit Not (Output)
Pin 2	Latch (Coil -)	Pin 8	Inhibit Not (Input)
Pin 3	N/C	Pin 9	Input Return
Pin 4	Unlatch (Coil +)	Pin 10	External Trim R
Pin 5	Unlatch (Coil -)	Pin 11	Output
Pin 6	Case	Pin 12	Input

Model No.	Case Style	Pin Count	Mounting
*3646	2	12	Solder Sealed Flangeless PCB Mount
*3646 F	3	12	Solder Sealed PCB Mount with Flange
*3646 I	5	12	Seam Weld Flangeless PCB Mount
*3646 IF	6	12	Seam Weld PCB Mount with Flange
*3646 WF	8	12	Seam Weld Chassis Mount with Flange
*3646 PE	12	12	Seam Weld Flangeless PCB Stud Mount

Case Dimensions

Units: inches | millimeters

Case Style	A	B	C	D	E	F	G
2	2.200 | 55.880	1.350 | 34.290	0.495 | 12.573	1.000 | 25.400	1.600 | 40.640	— | —	— | —
3 F	2.200 | 55.880	1.350 | 34.290	0.495 | 12.573	1.000 | 25.400	1.600 | 40.640	2.960 | 75.184	2.610 | 66.294
5 I	2.225| 56.515	1.350 | 34.290	0.495 | 12.573	1.000 | 25.400	1.600 | 40.640	— | —	— | —
6 IF	2.225 | 56.515	1.350 | 34.290	0.495 | 12.573	1.000 | 25.400	1.600 | 40.640	2.960 | 75.184	2.610 | 66.294
8 WF	2.225 | 56.515	1.710 | 43.434	0.495 | 12.573	— | —	1.600 | 40.640	2.960 | 75.184	2.610 | 66.294
12 PE	2.225 | 56.515	1.350 | 34.290	0.495 | 12.573	1.000 | 25.400	1.600 | 40.640	— | —	— | —

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