

MTC05



- COTS Component for Defense & Avionics Applications
- Environmental Performance to MIL-STD 810
- 10 to 50 VDC Transient Input Range
- 15 to 40 VDC Steady State Input Range
- 5W Max Output Power
- -55°C to 100°C Operation
- Cooling Plates and Optional Mounting Flange for Easy Integration
- Synchronous Rectification on Low Voltage Outputs
- MIL-STD 461E EMI Performance
- Frequency Synchronization

Introduction

The MTC05 is a COTS DC-DC converter developed specifically for the defense and avionics market. This product has a full military specification while offering the short lead-times and cost benefits of a COTS component.

The MTC05 uses a forward converter design switching at 450 kHz giving excellent size, efficiency and EMC performance. The input range is designed to provide short term operation over 10 – 50 VDC to enable the converter to work at full power through the dips and surges commonly seen in vehicle and aircraft applications. A soft start circuit provides well-controlled outputs with no overshoot.

Comprehensive control functions such as voltage trim, remote sense, inhibit and frequency synchronization to an external source are standard features.

When used in conjunction with the MTF input filter module the MTC05 complies to MIL-STD 461E CE/CS MIL-STD 1275A/B/C and MIL-STD 704A.



T H E X P E R T S I N P O W E R

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage	15.5	28	40	VDC	Continuous
Transient Input Voltage Range	10		50	VDC	10V for 10 s, 50V for 1 s at full load
UVLO Turn On	12.8		14.8	VDC	
UVLO Turn Off	8.5		9.8	VDC	
Maximum Input Current				A	See models and ratings table for details
Inrush Current		40		A	Peak value
Input Reverse Voltage Protection					External components required

Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage				VDC	See models and ratings table for details
Output Current				A	See models and ratings table for details
Output Set Tolerance			±100	mV	
Minimum Load	0			A	No minimum load required
Ripple & Noise Vout ≤5V		24	60	mV	100% load and 20 MHz BW
Vout >5V			1	%	100% load and 20 MHz BW
Overvoltage Protection ⁽¹⁾		None		%	See Overvoltage Protection application note.
Overcurrent Protection	105		150	%	At Vin nominal
Overtemperature Protection ⁽¹⁾	102		107	°C	Baseplate temp. with 2°C to 5°C hysteresis
Remote Sense			0.5	V	Total voltage compensation
Load Regulation			±1	%	Vout nominal
Load Step Output Transient			±3	%	Vout nominal 75-25% or 25-75% load changes
Load Step Recovery			500	µs	Within 1% of Vout nom
Line Regulation			±1	%	Vout nominal at 15.5-40 Vin
Line Step Output Transient			±3	%	Vout nominal at 15.5-40 Vin
Line Step Recovery			500	µs	Time for Vout to recover to 1% of Vout nom, with line step 15.5-40 Vin
Maximum Output Capacitance			300 x Iout max	µF	
Start Up Time		70		ms	See fig. 18 to 21

1. Overtemperature and Overvoltage Protection can be removed by factory please contact technical sales for more information.

Models & Ratings

Power	Output Voltage			Output Current	Input Current ⁽³⁾		Efficiency	Model Number
	Nominal	Min ⁽¹⁾	Max ⁽¹⁾		No Load	Full Load		
4 W	3.3 VDC	3.3 VDC	4.0 VDC	1.21 A	0.03 A	0.18 A	80%	MTC0528S3V3
4 W	5 VDC	4.0 VDC	6.0 VDC ⁽²⁾	0.80 A	0.02 A	0.19 A	77%	MTC0528S05
5 W	12 VDC	9.0 VDC	13.8 VDC	0.42 A	0.02 A	0.23 A	78%	MTC0528S12
5 W	15 VDC	11.0 VDC	17.0 VDC	0.33 A	0.01 A	0.23 A	77%	MTC0528S15
5 W	28 VDC	20.0 VDC	30.0 VDC	0.18 A	0.02 A	0.22 A	78%	MTC0528S28

1. Indicates maximum and minimum voltage adjustment (Maximum includes Remote Sense adjustment).

2. The full trim range is not available when the input is <15.5V.

3. Vin = 28 VDC.

General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency				%	See models table and performance graphs
Isolation Voltage			1500	VDC	Input to output
			1000	VDC	Input to case
			500	VDC	Output to case
Switching Frequency	400	450	500	kHz	Frequency synch 400-500 kHz. See note
MTBF					Consult technical sales
Inhibit	On = TTL High or open circuit; Off = TTL Low or short circuit				
Rth Case - Ambient	Output Voltage			Rth Case - Ambient	
	3.3 V			26.4 °C/W	
	5 V			24.3 °C/W	
	12 V			22.0 °C/W	
	15 V			21.1 °C/W	
	28 V			22.0 °C/W	

Note. Control signal needs to be TTL 0-5 VDC square wave. The trigger is the falling edge.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Case Temperature	-40		+100	°C	Baseplate temperature
Operating Ambient Temperature	-40		+85	°C	
Extended Temperature Range	-55		+100	°C	Baseplate temperature. See note.
Storage Temperature	-55		+100	°C	
Humidity			88	%	Relative humidity
Salt Atmosphere			48	Hours	MIL-STD 810E Method 509.1
Altitude			70000	Ft	MIL-STD 810D Method 500.2
Shock			100	g	MIL-STD 810D Method 516.3
Vibration	10		2000	Hz	MIL-STD 810D Method 514.3
Bump			40	g	2000 bumps in each axes MIL-STD 810D Method 516.3

Note. For -55 °C extended operating range, add suffix '-LT' to the part number. e.g. MTC0528S05-LT

Electromagnetic Compatibility

	Standard	Test Level	Criteria	Notes & Conditions
Conducted Emissions	MIL-STD-461E	CE101/CE102		MTF50 module is required
	DEF-STAN-59-41	TBA		MTF50 module is required
Immunity	MIL-STD-1275A/B/C	Spikes Surges Ripple	±250 V for 100 µs 100 V for 50 ms (see note) 14 VAC pk-pk	MTF50 module is required
	MIL-STD-704A	600 V input transient	10µs 50Ω source impedance	MTF50 module is required
	MIL-STD-704B-F		50 V for 10 ms	
Conducted Susceptibility	MIL-STD-461E	CS101, CS114, CS115, CS116		MTF50 module is recommended

Note. 0.5 Ω source impedance

Safety Approvals

Standard	Category
CE	LVD

Voltage Trim

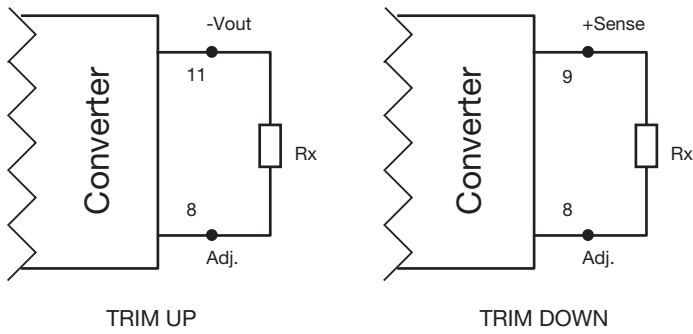


Figure 1. MTC05 - Trim Connections

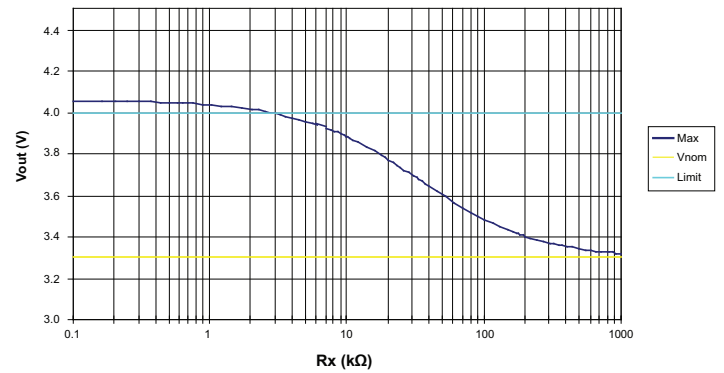


Figure 2. MTC0528S3V3 - Max and Min Adjustment

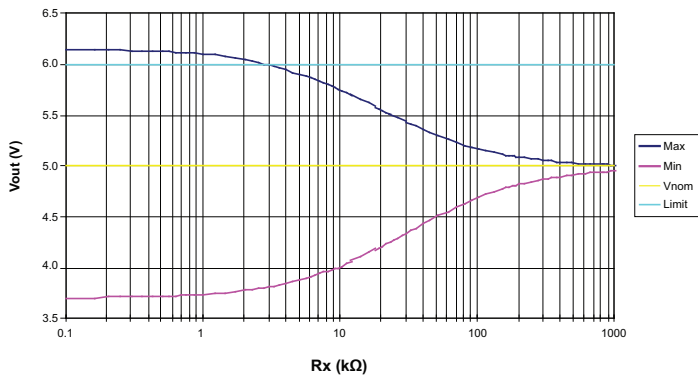


Figure 3. MTC0528S05 - Max and Min Adjustment

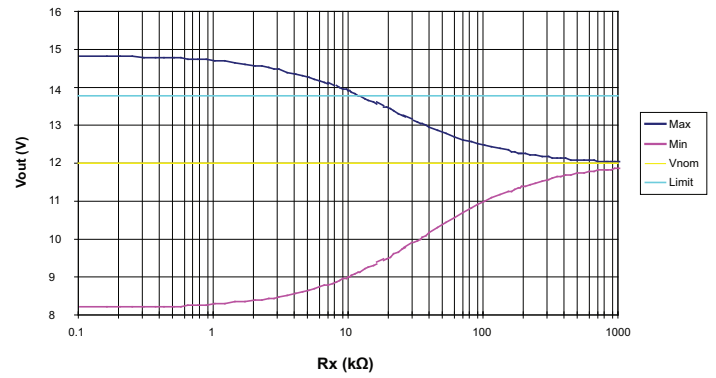


Figure 4. MTC0528S12 - Max and Min Adjustment

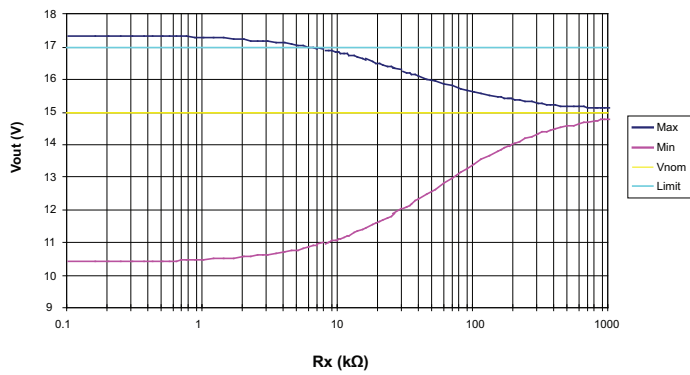


Figure 5. MTC0528S15 - Max and Min Adjustment

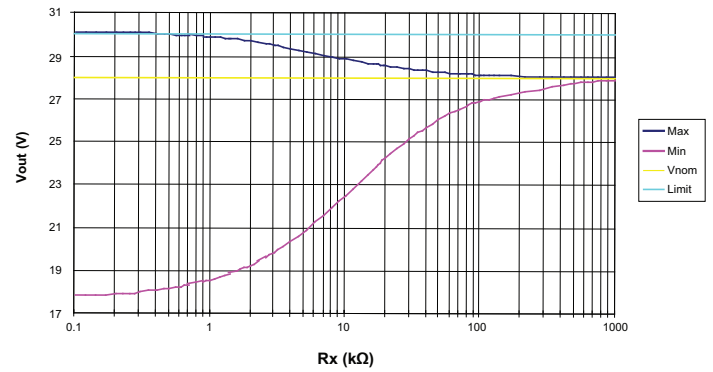


Figure 6. MTC0528S28 - Max and Min Adjustment

Notes.

1. When adjusting the output voltage do not go above the specified output voltage range (refer to tables) as the Over Voltage Protection may be triggered when fitted.

EMC Performance Curves

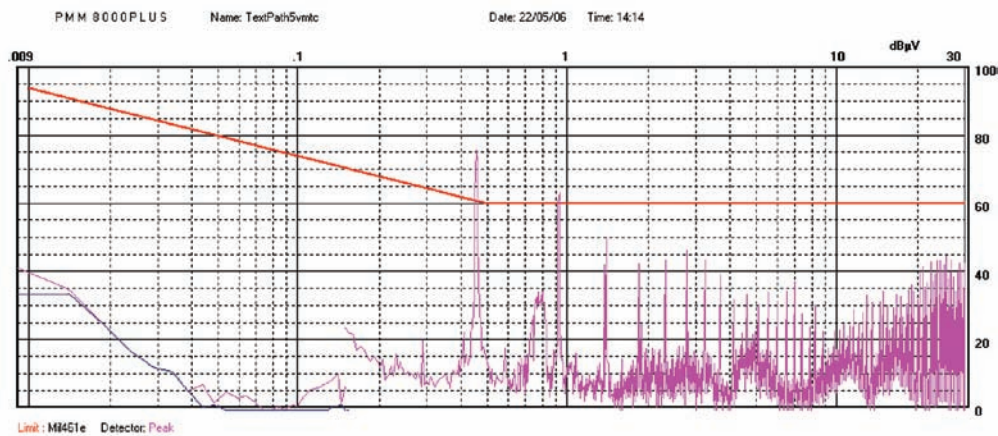


Figure 7. MTC0528S05 without a filter

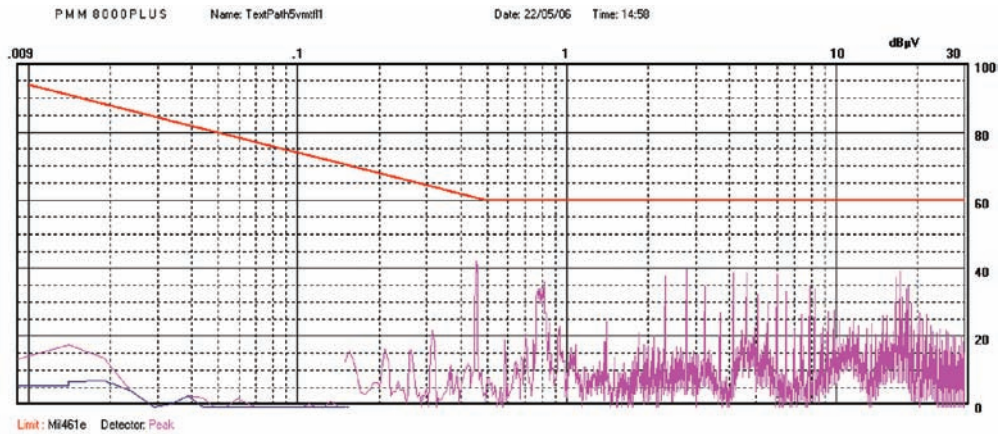


Figure 8. MTC0528S05 with MTF50 filter

EMC Filter Connection Diagram

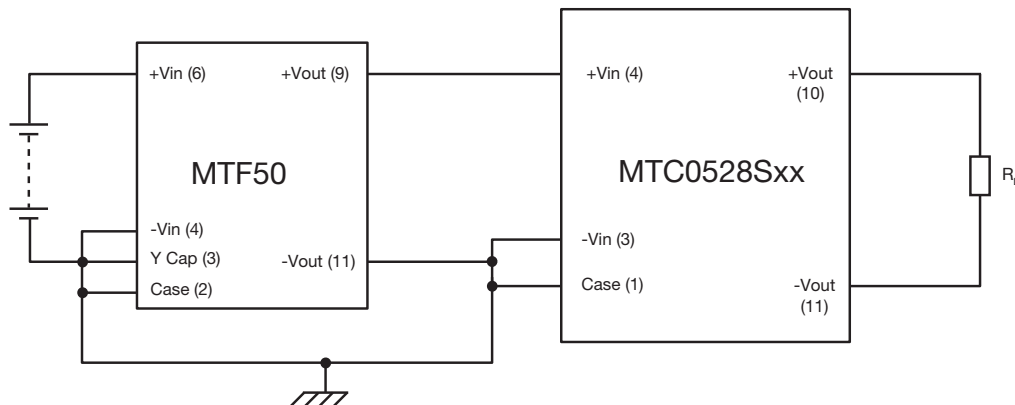


Figure 9. MTC05 - EMC Filter connection diagram

Block Diagram

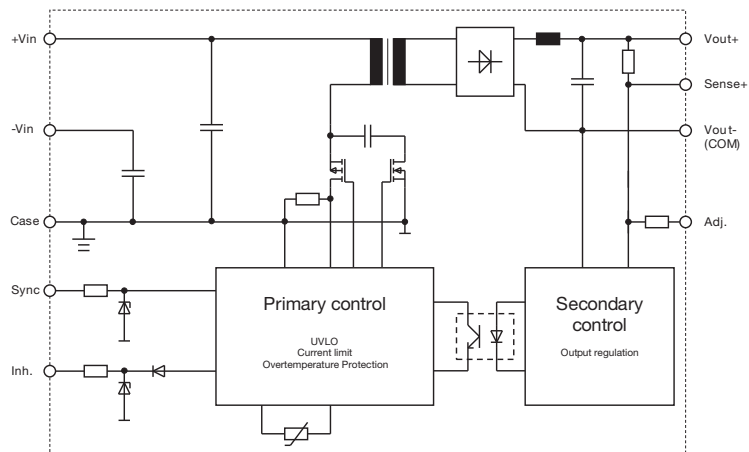
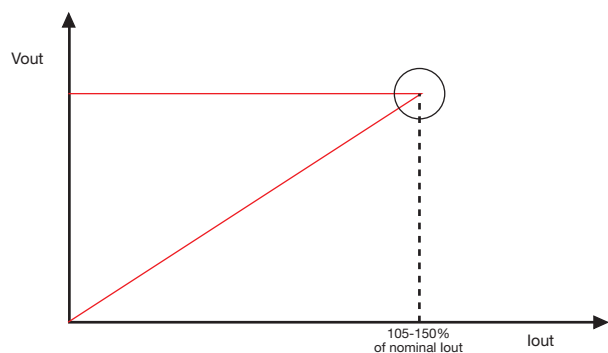


Figure 10. MTC05 Block Diagram

Overcurrent Protection



MTC0528SXX has a trip and restart (hiccup mode) protection which will turn off the converter after reaching the limit between 105% to 150% of full load. The converter will attempt to restart after approximately 700ms.

Figure 11. Overcurrent Protection

Remote Sensing

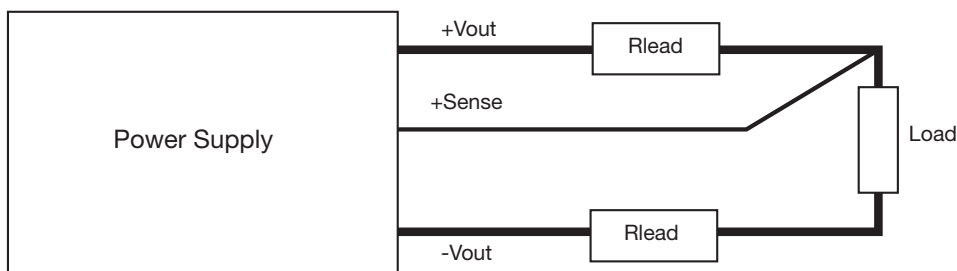


Figure 12. MTC05 - Remote Sense Connection Diagram

Notes.

1. To use the remote sense connect +Sense pin to +Vout.
2. When trim or remote sense are not in use leave Sense pin not connected or connected locally to +Vout.

Parallel Configuration

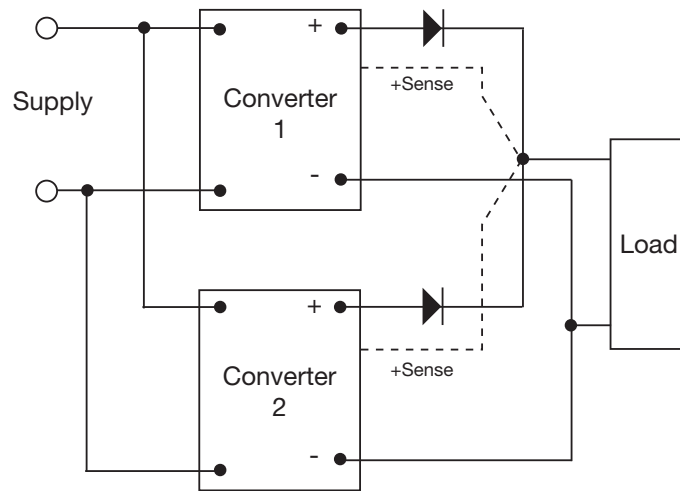


Figure 13. Parallel configuration suitable for redundant operation

Overvoltage Protection

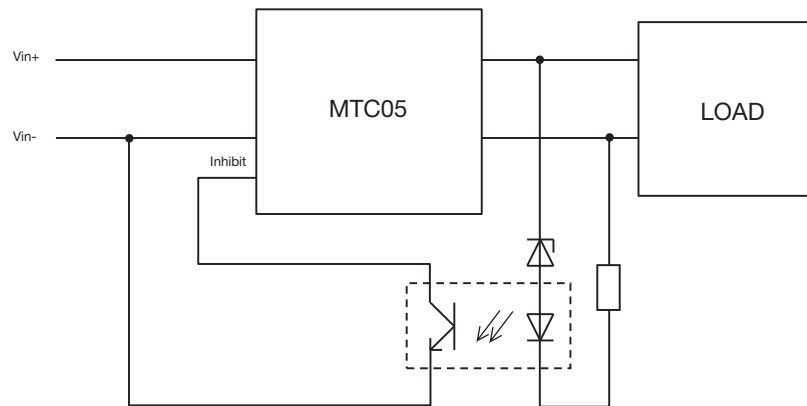


Figure 14. Overvoltage Protection - Trip & Restart

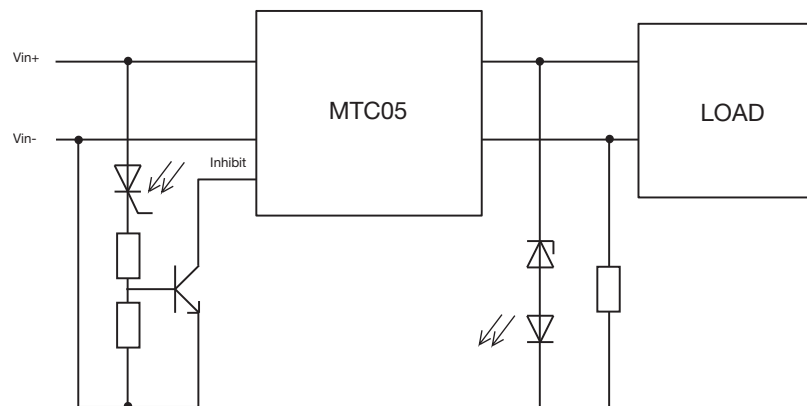


Figure 15. Overvoltage Protection - Latched

Efficiency

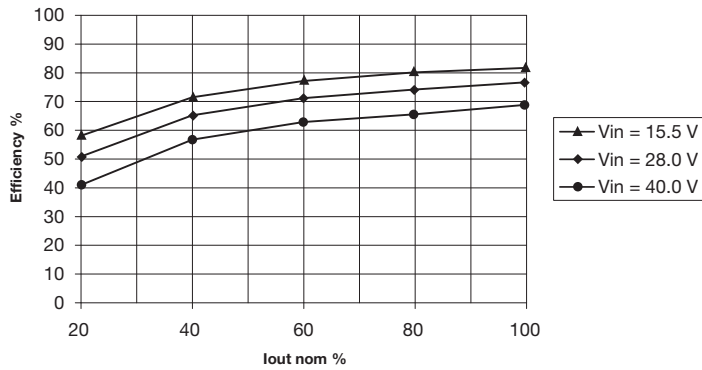


Figure 16. Typical efficiency for MTC0528S05

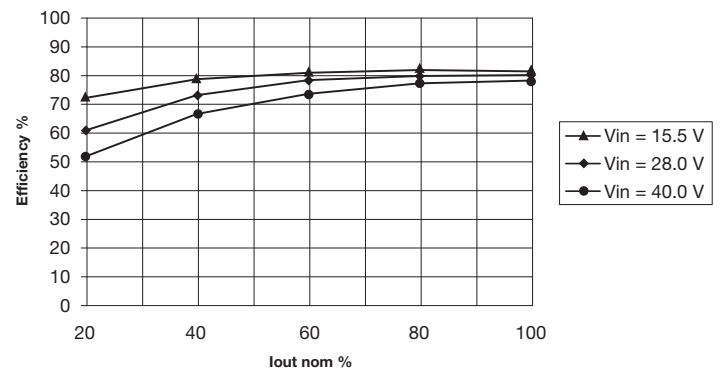


Figure 17. Typical efficiency for MTC0528S28

Start Up Time

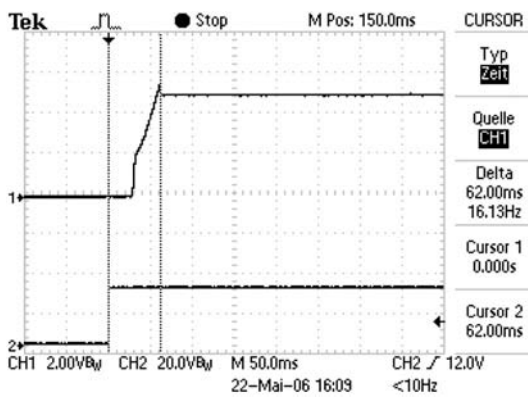


Figure 18. Start up time for MTC0528S05 with full resistive load - 62 ms

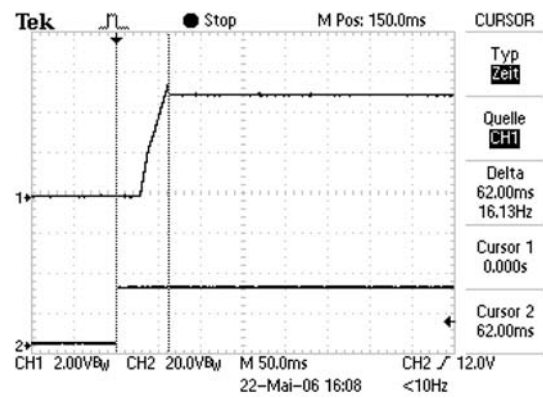


Figure 19. Start up time for MTC0528S05 at full load and 240 μ F - 62 ms

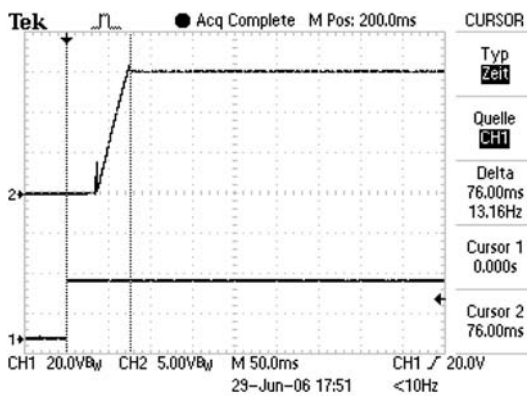


Figure 20. Start up time for MTC0528S28 with full resistive load - 76 ms

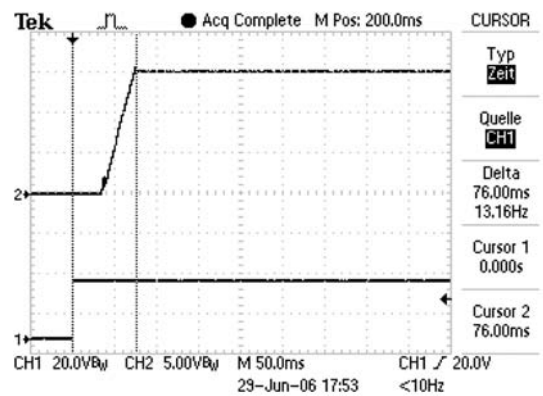
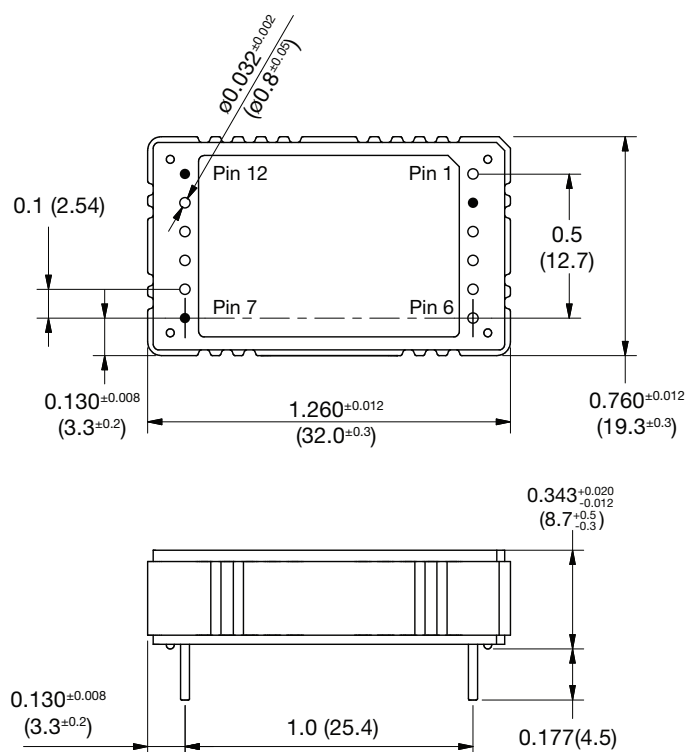


Figure 21. Start up time for MTC0528S28 at full load and 99 μ F - 76 ms

Mechanical Details



MTC05 Connections	
Pin	Function
1	Case
2	No Pin
3	- Vin
4	+ Vin
5	Synchronisation
6	Inhibit
7	No Pin
8	Adjust
9	+Sense
10	+Vout
11	-Vout
12	No Pin

Notes.

1. Dimensions are in inches (mm)
2. Tolerance: ±0.02 inches (±0.5 mm)
3. Weight: 0.02 lb (10 g)
4. Materials & Finish:
 - Pin - Material: Cu Zn30 2.5µm Ni
Finish: 0.2-0.5µm AU (HV 170-200)
 - Case - Material: Aluminium (Al Mg Si 0.5)
Finish: Chromated
 - Nameplate - Non-conductive plastic



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