EV3510_S0_R1

48V_{IN} Micropower No-Opto Isolated Flyback Converter with 75V/1.4A Switch

Parameters Subject to Change Without Notice

FEATURES

- 3.0V to 48VInput Voltage Range
- 1.4A, 75V Internal DMOS Power Switch
- Up to 430KHz Operating Frequency
- Low Quiescent Current
- Boundary Mode Operation at Heavy Load
- Burst Mode Operation at Light Load
- V_{OUT} Set with a Single External Resistor
- Minimum Load <0.5% (Typ) of Full Output
- No Transformer Third Winding or Opto-Isolator Required for Regulation
- Internal Compensation and Soft-Start
- Input under voltage lockout
- Output Short-Circuit Protection
- Thermal Protection
- SOT23-5 Package

APPLICATIONS

- Isolated Telecom, Automotive, Industrial, House keeping Power Supplies
- Isolated Auxiliary Power Supplies
- Wide Input Voltage Range Micropower system

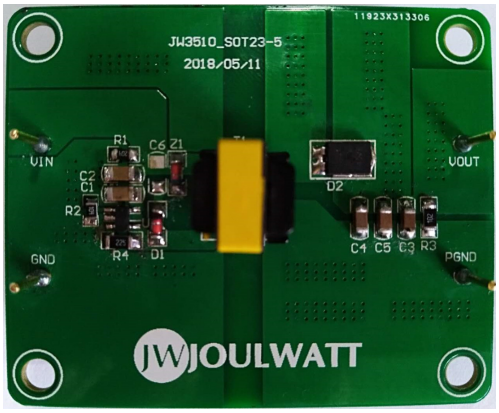
DESCRIPTION

JW®3510is a micropower isolated Flyback converter.By sampling the isolated output voltage directly from the primary-side flyback waveform, the part requires no third winding or opto-isolator for regulation. The output voltage can be programmed with a single external resistor. Besides, internal compensation and soft-start further reduce external component count.

The JW3510 operates with an input voltage range of 3.0V to 48V and can deliver up to 7W of isolated output power. The primary-side can deliver 1.4A peak current with an internal integrated 75V N-Channel DMOS power switch. The JW3510 is designed with boundary mode, discontinuous mode and burst mode operation at different load to improve load regulation and maintain high efficiency while minimizing the output voltage ripple.

JW3510 is available in the SOT23-5 package. The high level of integration results in a simple to use, low component count, and high efficiency application solution for isolated power delivery.

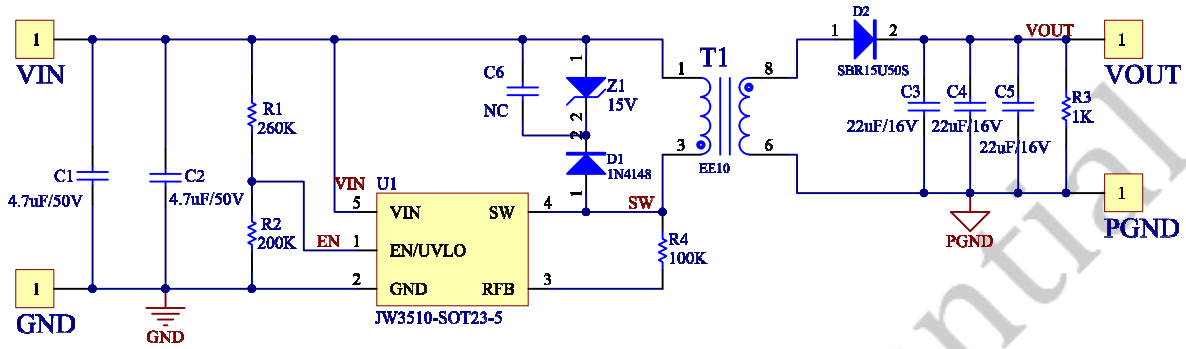
EVALUATION BOARD



ELECTRICAL SPECIFICATIONS

Description	Symbol	Min	Typ.	Max	Unit	Comment
Input						
Input voltage	V_{IN}	3		48	V	
Output						
Output voltage	V_{OUT}	4.75		5.25	V	
Output current	I_{OUT}			0.32	A	V_{IN}=5V
				0.64		V_{IN}=12V
				0.84		V_{IN}=24V
				0.92		V_{IN}=36V
Output Ripple Voltage	V_{RIPPLE}			100	mV	Set oscilloscope at 20MHz bandwidth
Total Output Power						
Continuous Output Power	P_{OUT}			4.75	W	
Efficiency	η	80			%	
Environmental						
Ambient Temperature	Ta	-25		+45	℃	

SCHEMATIC



BILL OF MATERIALS

Quantity	Designator	Comment	Description	Footprint	Manufacturer	Manufacturer P/N
2	C1, C2	4.7uF/50V/1206	Capacitor	1206		
3	C3, C4, C5	22uF/16V/1206	Capacitor	1206		
1	D1	1N4148	Diode	LL-34		
1	D2	SBR15U50S	Diode	POWERDI5		
1	R1	260K/5%/0805	Resistor	0805	Uniohm	
0	R2	200K/5%/0805	Resistor	0805	Uniohm	
1	R3	1K/5%/1206	Resistor	1206	Uniohm	
1	R4	100K/1%/1206	Resistor	1206	Uniohm	
1	T1	Lp=40uH, Np:Ns=18:9	Transformer	EE10		
1	U1	JW3510	IC	SOT23-5	Joulwatt	JW3510
1	Z1	30V	Zener	LL-34		

PRINTED CIRCUIT BOARD LAYEROUT

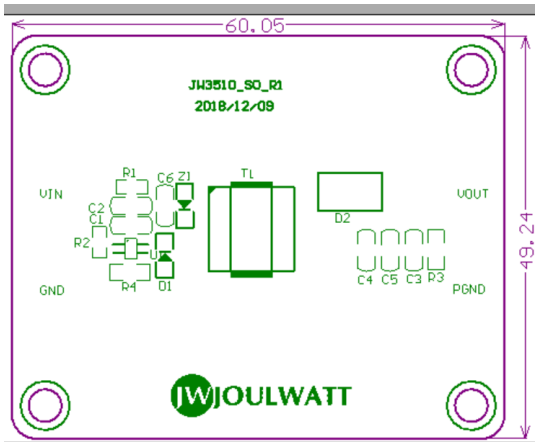


Figure1—Top Silk Layer

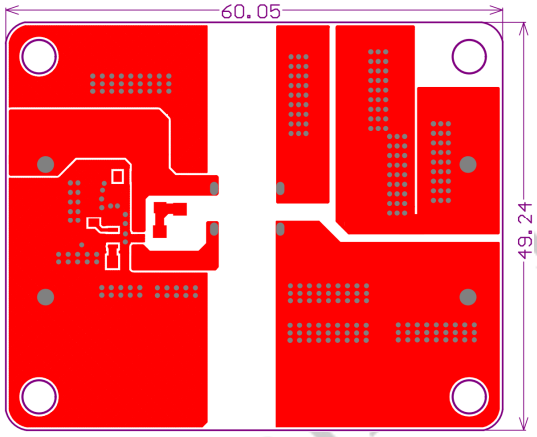


Figure2—Top Layer

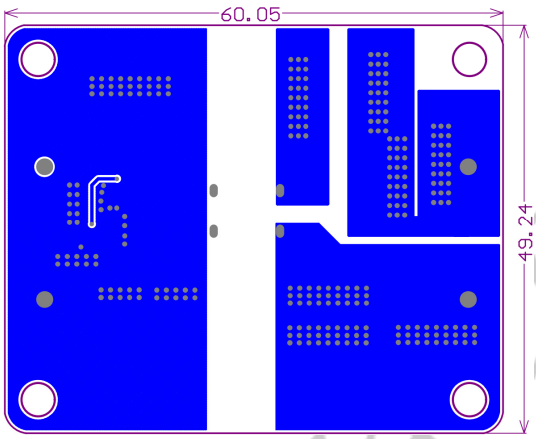


Figure3—Bottom Layer

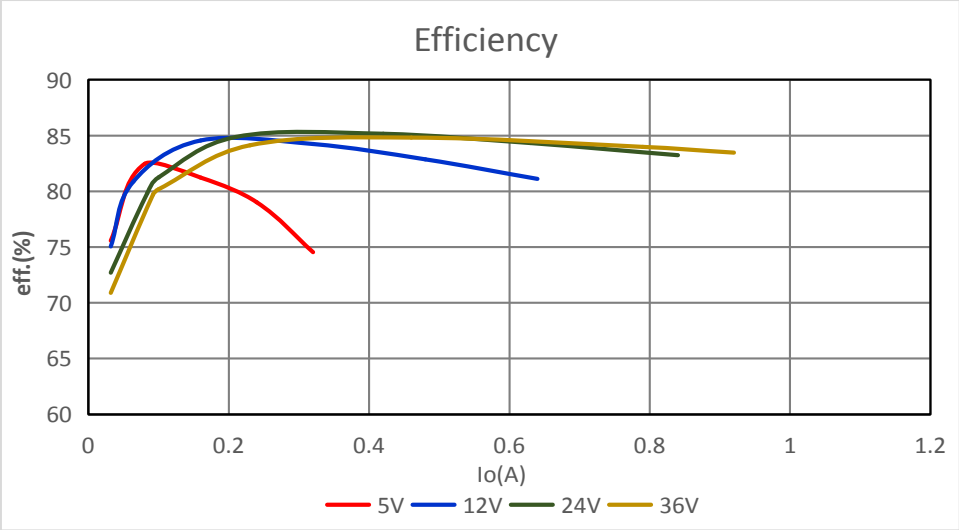
QUICK START

1. Connect the load with VOUT, PGND.
2. Set the DC source to 3V~48V, turn off the source.
3. Connect the “+” of DC source to the “VIN”, and “-” to “GND”.
4. Turn on the DC source; the evaluation board starts operating in normal condition.
5. To get more information, please refer to the datasheet of JW3510.

TYPICAL PERFORMANCE CHARACTERISTICS

1. Efficiency

1.1Efficiency Curve



1.2Efficiency Data

Test condition: input voltage ranges **5V/12V/24V/36V**, Output voltage Vo is **5V**.

Input	10% load	25% load	50% load	75% load	100% load	Average effi. 25%~100% load	Test result
5V	75.58	82.46	81.24	79.02	74.55	79.32	OK
12V	80.89	84.56	84.23	82.87	81.10	83.19	
24V	81.26	84.88	85.14	84.31	83.22	84.39	
36V	79.70	84.13	84.83	83.99	83.46	84.10	

2. Output Characteristics

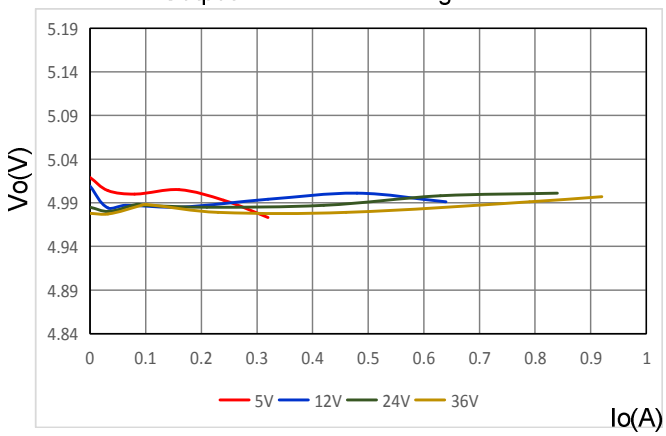
2.1 Line and load regulation

Test condition: input voltage ranges **5V/12V/24V/36V**, Output voltage Vo is **5V**.

Input Voltage	No load	1/4 load	1/2 load	3/4 load	Full load	Spec.	Test result
5V	5.004	5.000	5.005	4.993	4.973	4.75V-5.25V	OK
12V	4.984	4.985	4.994	5.001	4.991	4.75V-5.25V	OK
24V	4.980	4.985	4.987	4.998	5.001	4.75V-5.25V	OK
36V	4.977	4.979	4.979	4.991	4.997	4.75V-5.25V	OK
Line regulation	<1%					< 2%	OK
Load regulation	<1%					< 2%	OK

Note: Output voltage was measured at the end PCB.

Output Line and Load Regulation

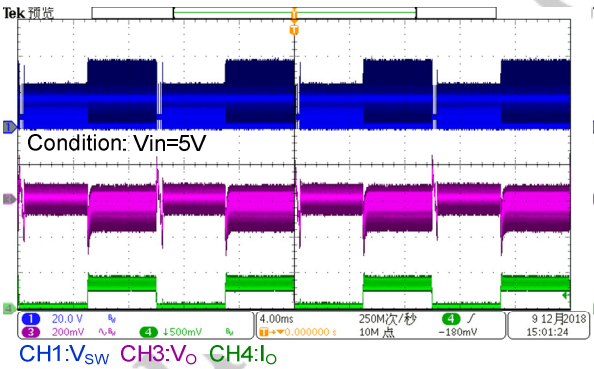


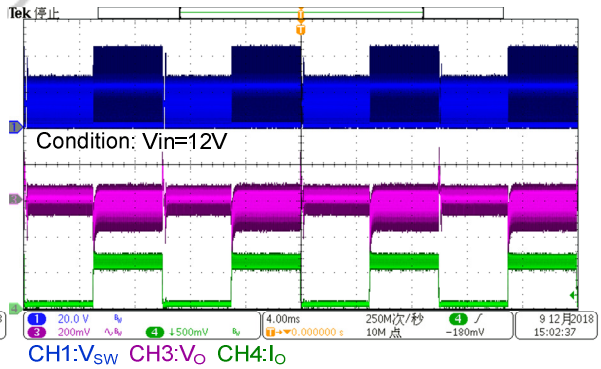
3. Dynamic Load Response

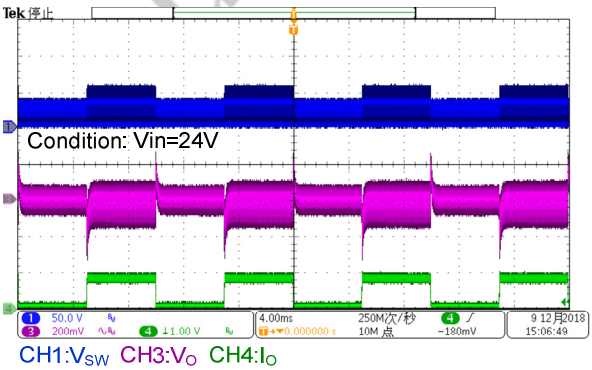
Test condition: input voltage ranges **5V/12V/24V/36V**, Output voltage Vo is **5V**.

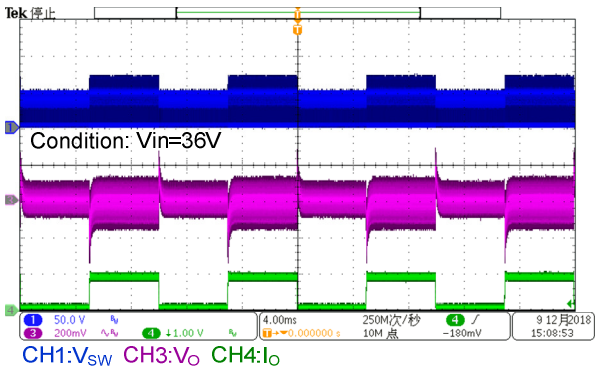
Frefuency:100Hz; duty cycle: 50%; slew rate: 2.5A/μs; load: 0.48A->4.32A->0.48A.

Input Voltage	Load	V_{omin}~V_{omax}
5V	0.04A->0.4A->0.04A	4.75V~5.25V
12V	0.08A->0.8A->0.08A	4.75V~5.25V
24V	0.11A->1.1A->0.11A	4.75V~5.25V
36V	0.13A->1.3A->0.13A	4.75V~5.25V



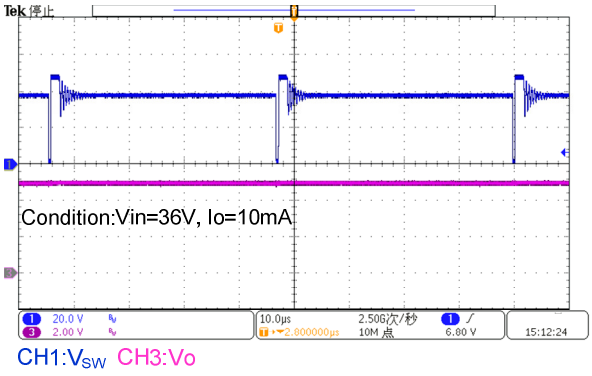


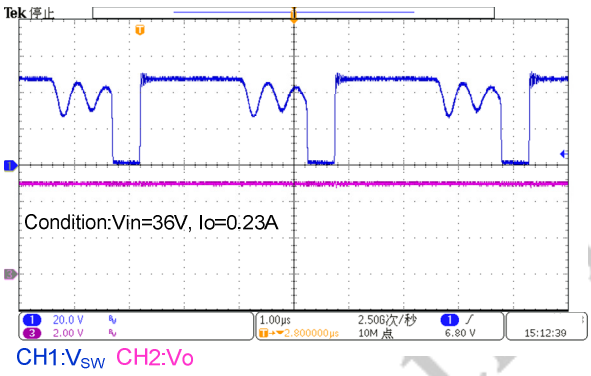




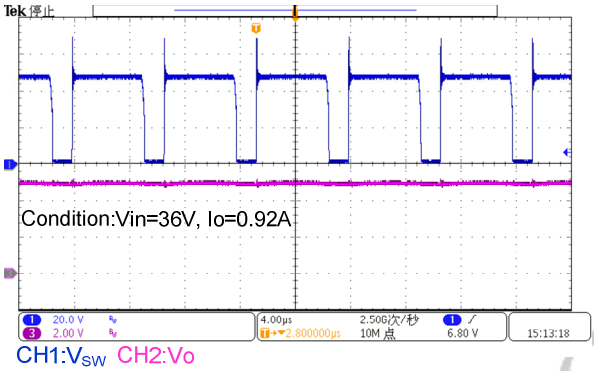
4. Operation Modes

Test condition: input voltage ranges **5V/12V/24V/36V**, Output voltage Vo is **5V**.





Burst Mode WaveformsDiscontinuous Mode Waveforms

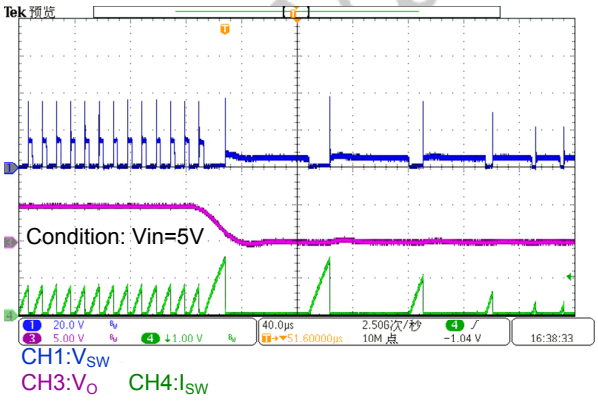


Boundary Mode Waveforms

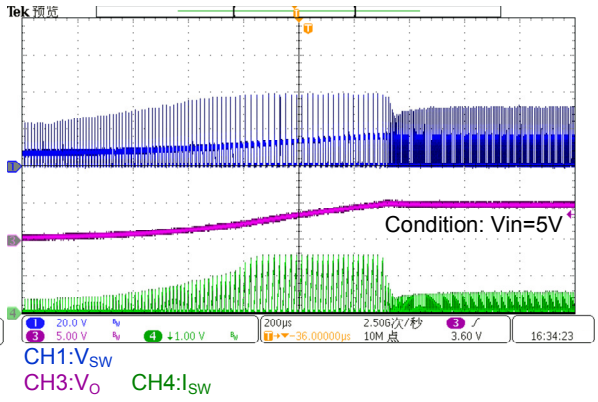
5. ShortCircuitProtection

Test condition: input voltage ranges **5V/12V/24V/36V**. **Output is short circuit condition**.

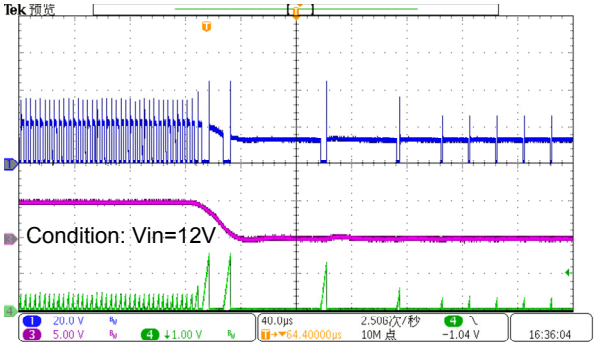
Entry

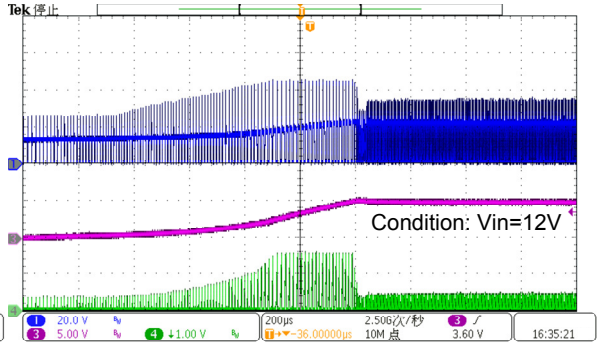


Recovery

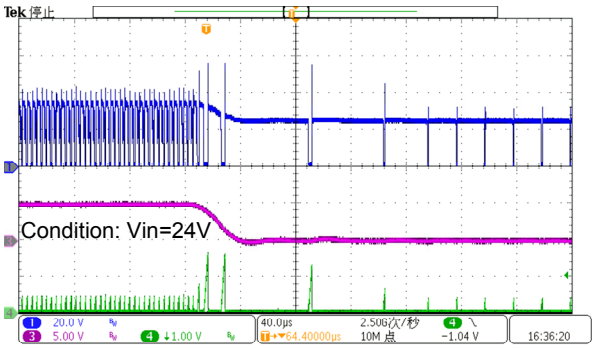


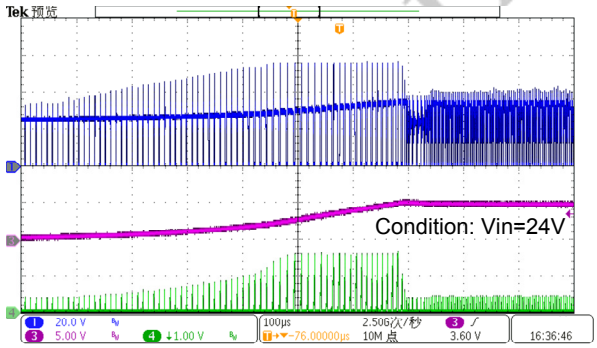
Vin=5V



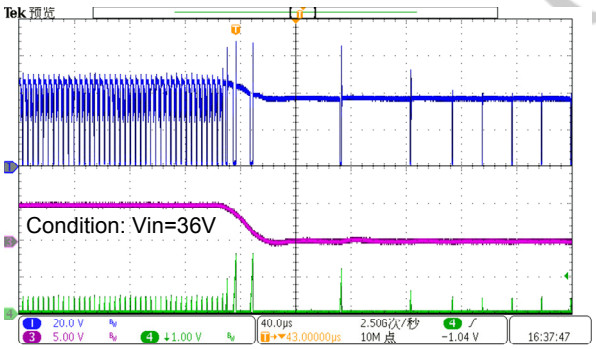


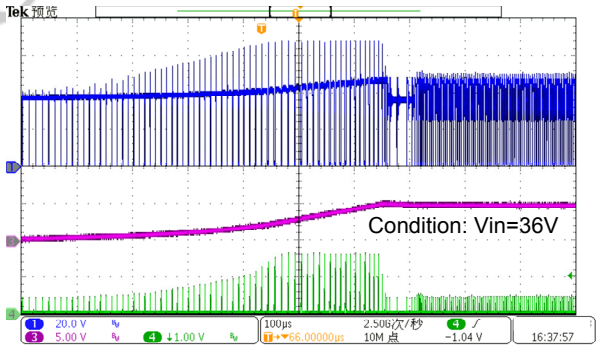
Vin=12V





Vin=24V



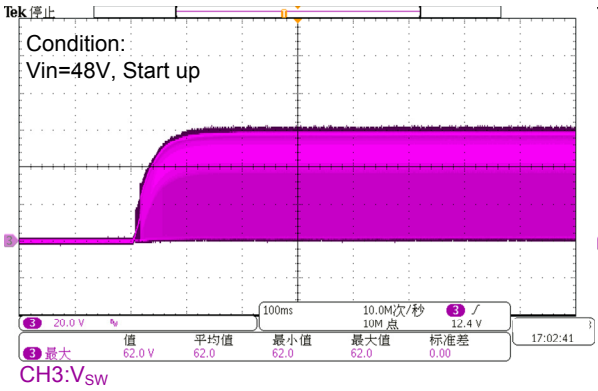


Vin=36V

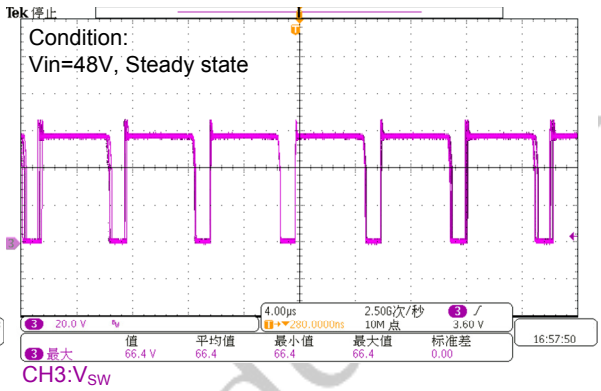
6. VoltageStress on MOSFET

Test condition: input voltage is 48**V**.Output voltage Vo is **5V**.

Input Voltage	Condition	V_{DS_MAX}
48V	Start up	62.0V
48V	Full load (steady state)	66.4V



CH3:V_{SW}



CH3:V_{SW}

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