



1.0 Design Specifications

Inputs	Outputs #1	Outputs #2	Outputs #3
VinMin=10.8	Vout1=100	Vout2=-36	Vout3=-52
VinMax=13.2	Iout1=0.035	Iout2=0.04	Iout3=.045

2.0 Design Description

The LM5020 PWM controller is used here to design a low cost, multi-output, flyback power supply. In this case there are three output voltage rails formed by the use of multiple secondary windings off of the transformer, T1. Regulation is typically better than 5% on the master output, 100V, which is sampled and fed back to the controller; whereas, the slave regulation, accomplished through cross coupling, is good to within +/-20% on the negative 36V and 52V outputs. The input voltage, Vin, charges up energy in the primary coil of the transformer during the on-time of the FET switch, M2; then, during the off-time this energy is coupled to the secondary to

the three outputs through the diodes, D1,2,3, as part of what's known as a "flyback" action. Low cost is achieved by using small ceramic capacitors on the input, C4, and the outputs, C6,7,8. The feedback signal to complete the control loop and to provide transient compensation is provided by the resistor/capacitor combinations created by R6,7,10, and C9,10.

Notes:

1. T1 is an off-the-shelf part.
2. T1 in the schematic is shown as L1 in the PCB layout.
3. The MOSFET M2 in the schematic is shown as U2 in the PCB layout.

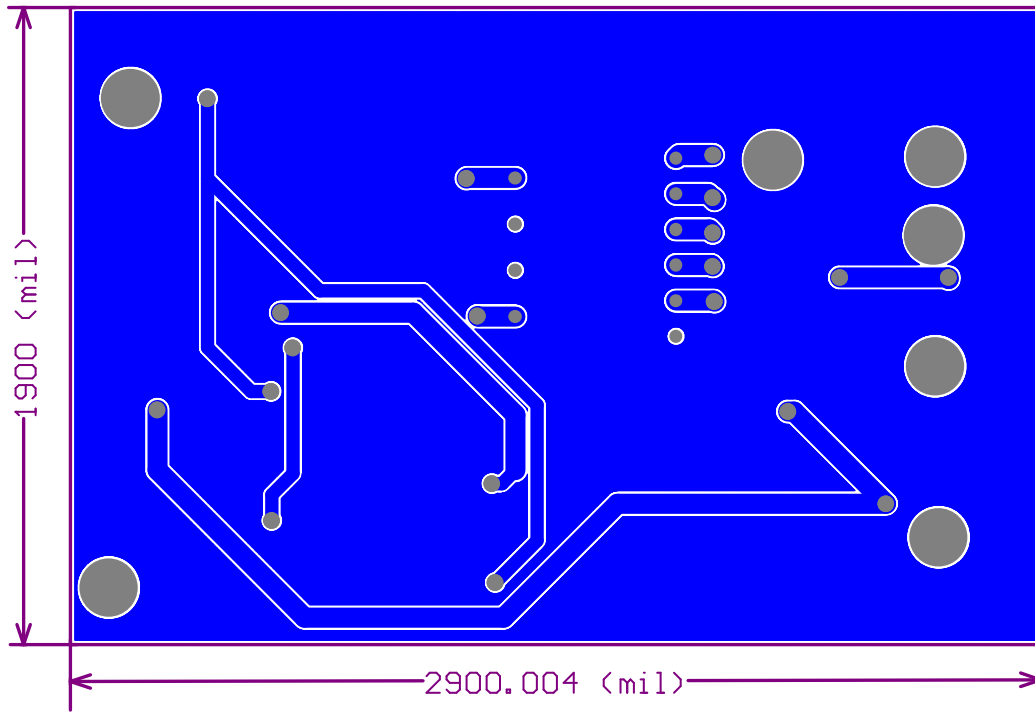
3.0 Schematic

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

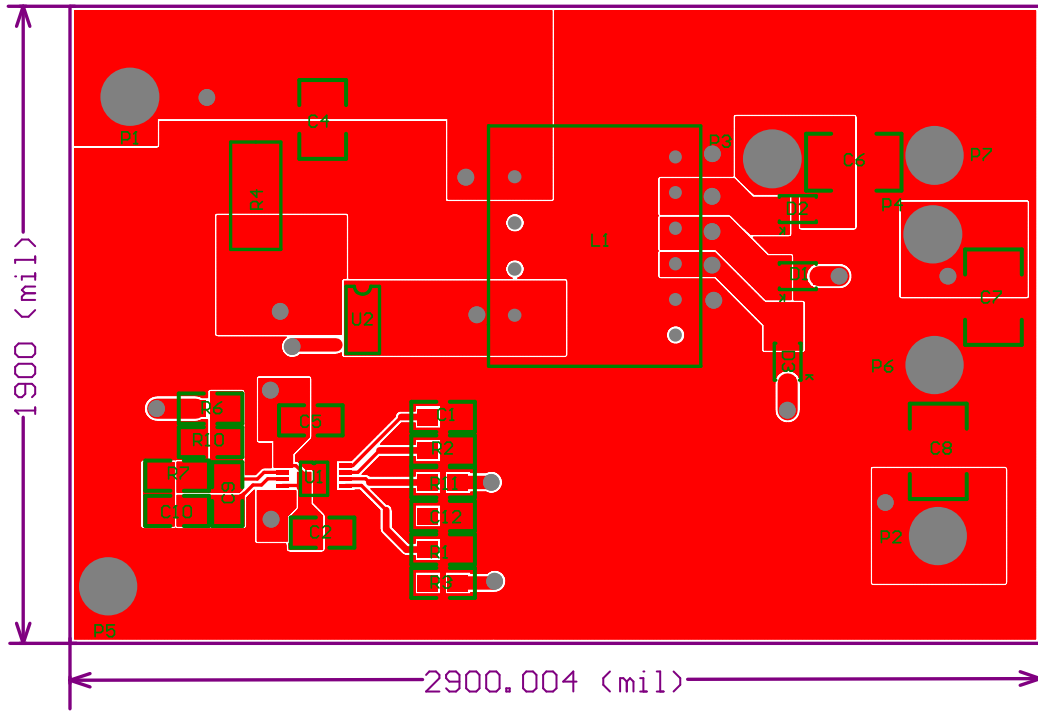
Part	Manufacturer	Part#	Attributes
C1	Vitramon	VJ0805Y103KXXAT	10n F
C10	Vitramon	VJ0805Y103KXXAT	10n F
C12	Vitramon	VJ0805A471KXXAT	470p F
C2	Vitramon	VJ0805Y103KXXAT	10n F
C4	TDK	C3225X5R1C106M	10u F
C5	Vitramon	VJ0805Y104KXXAT	100n F
C6	TDK	C3225X7R1H335M	3.3u F
C7	TDK	C4532X7R2A225M	2.2u F
C8	TDK	C4532X7R2A225M	2.2u F
C9	Vitramon	VJ0805Y102KXXAT	1n F
D1	ONSEMI	MURS120	0.875 V
D2	ONSEMI	MURS120	0.875 V
D3	ONSEMI	MURS240	1.15 V
M2	Siliconix	SI4850EY	
R1	Dale	CRCW08051002FRT6	10k Ohms
R10	Dale	CRCW08051211FRT6	1.21k Ohms
R11	Dale	CRCW08053010FRT6	301 Ohms
R2	Dale	CRCW08051742FRT6	17.4k Ohms
R3	Dale	CRCW08054992FRT6	49.9k Ohms
R4	Dale	WSL2512 0R10	0.1 Ohms
R6	Dale	CRCW08059762FRT6	97.6k Ohms
R7	Dale	CRCW08053012FRT6	30.1k Ohms
T1	Pulse	PA1051	
U1	National Semiconductor	LM5020	

5.0 Layout



PADC_NSC0288_lo_1

FIGURE 2. Board's Bottom View



PADC_NSC0288_lo_2

FIGURE 3. Board's Top View

6.0 Waveforms

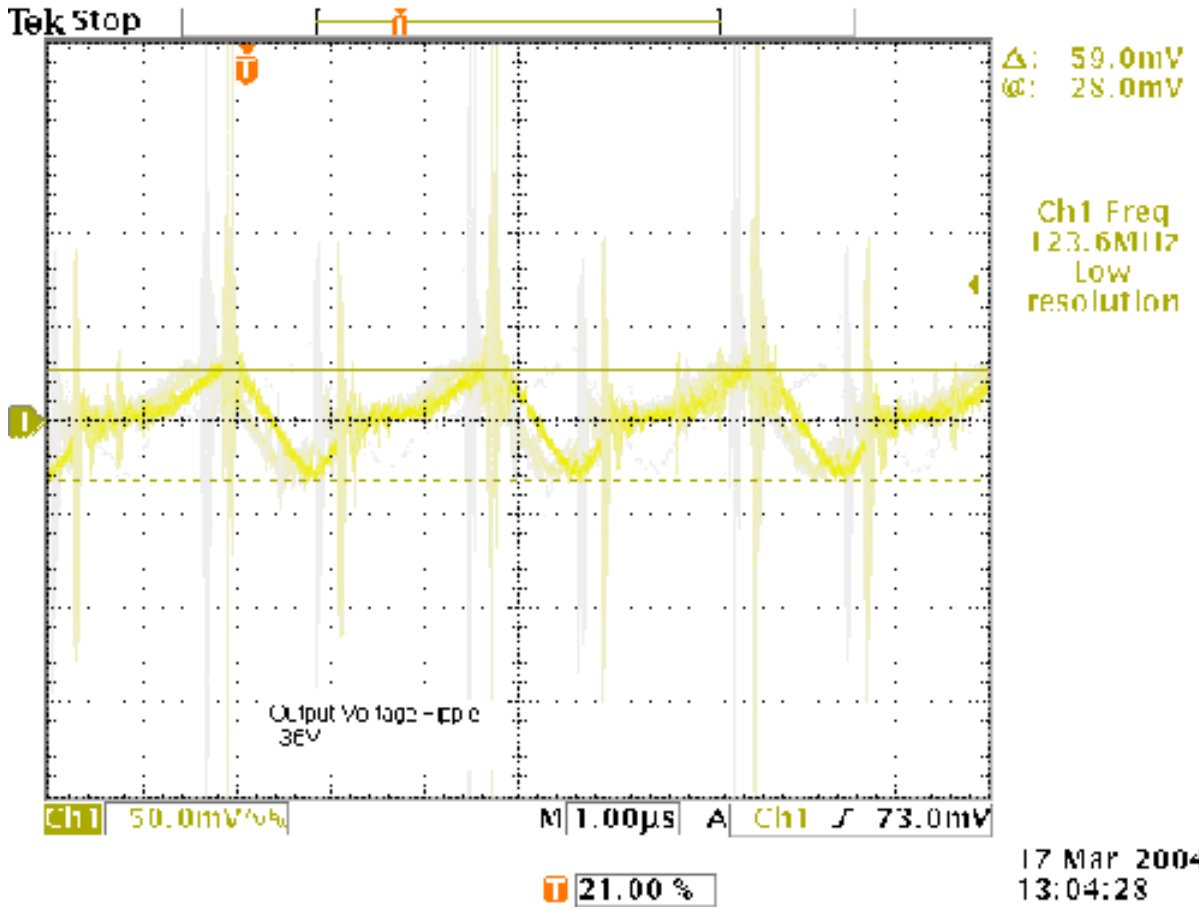


FIGURE 4. NSC0288-Output Voltage ripple -36V

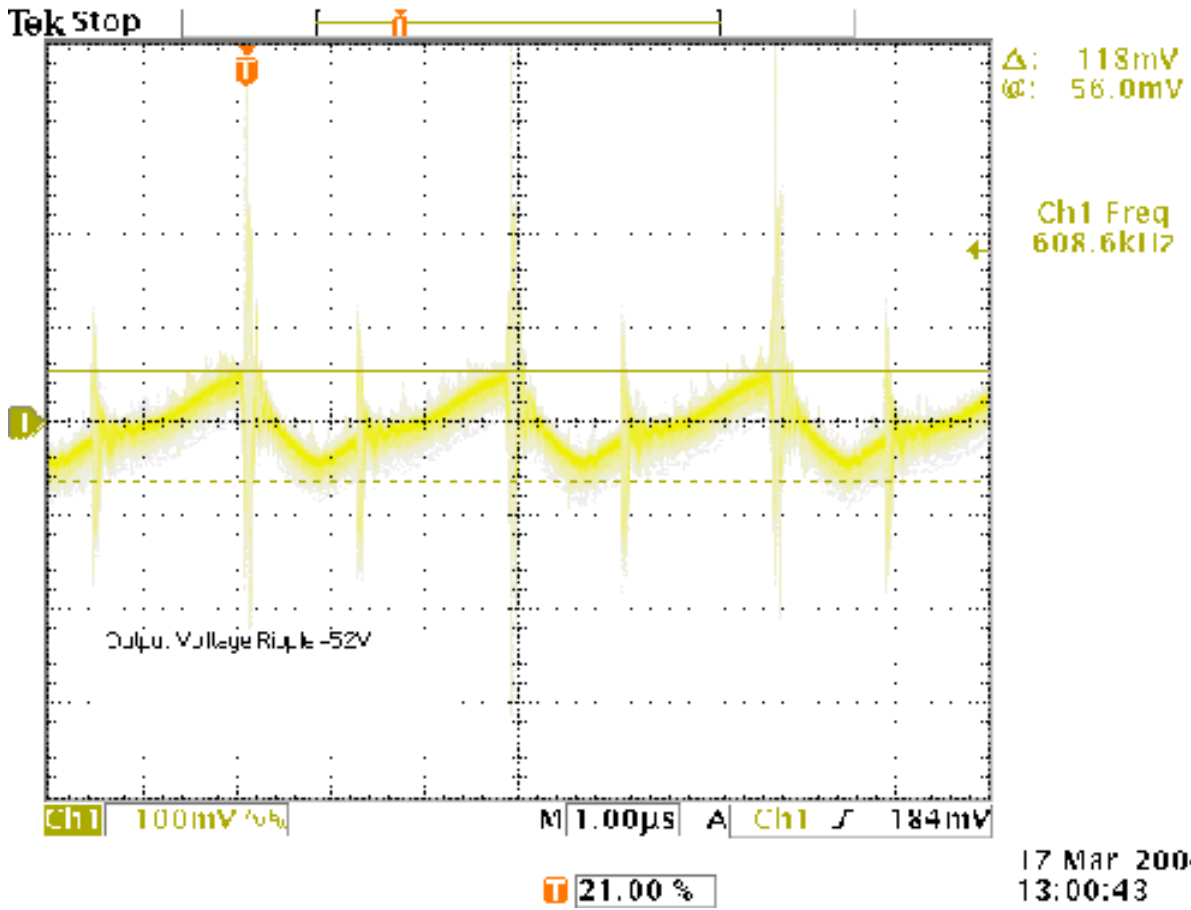


FIGURE 5. NSC0288-Output Voltage ripple -52V

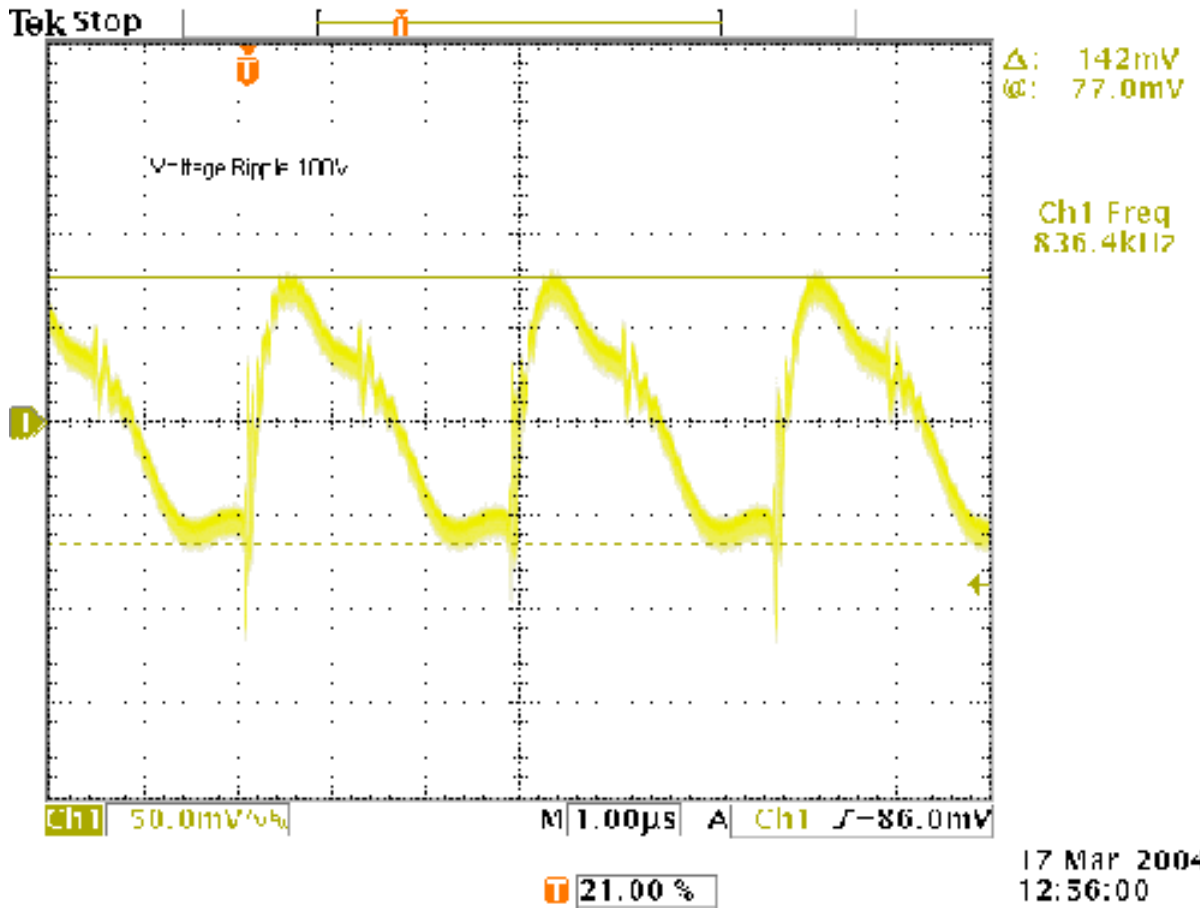


FIGURE 6. NSC0288-Output Voltage ripple 100V

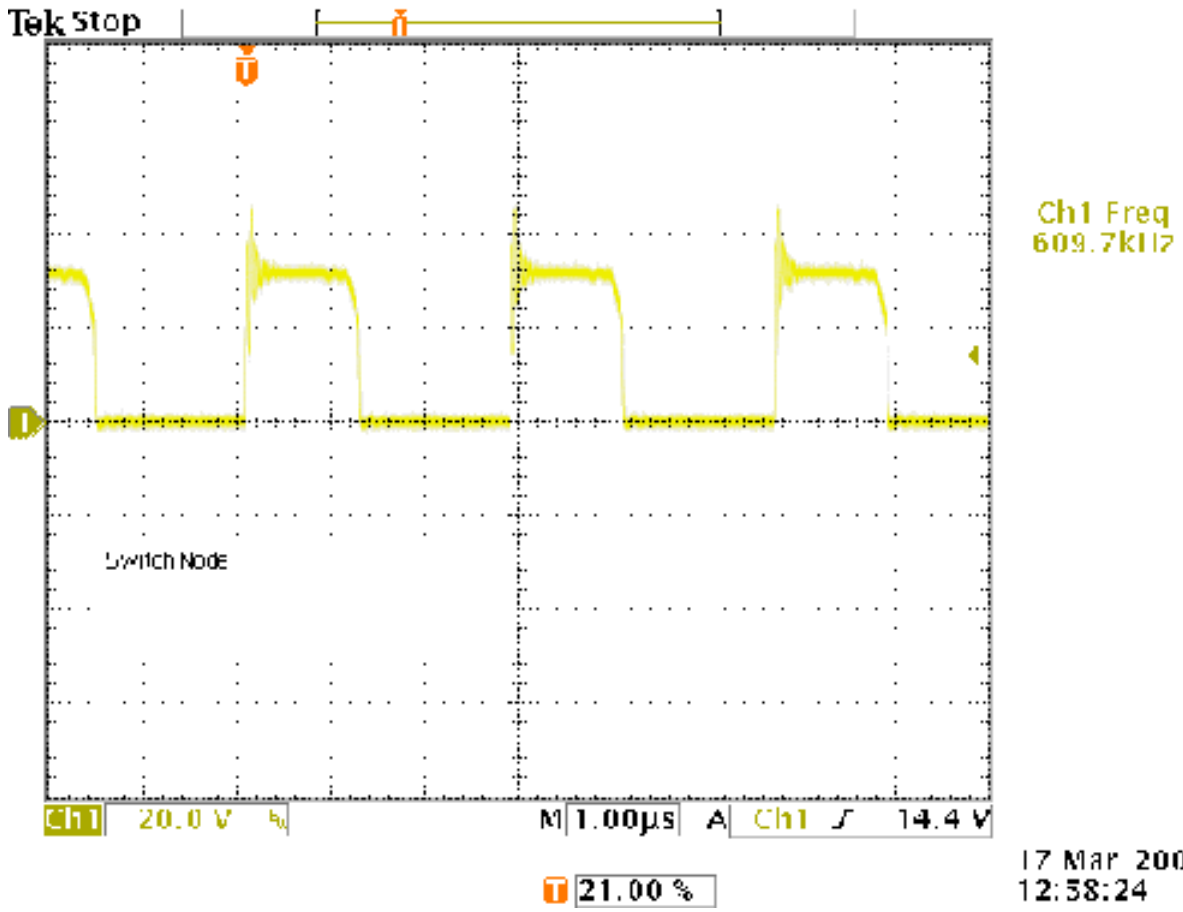
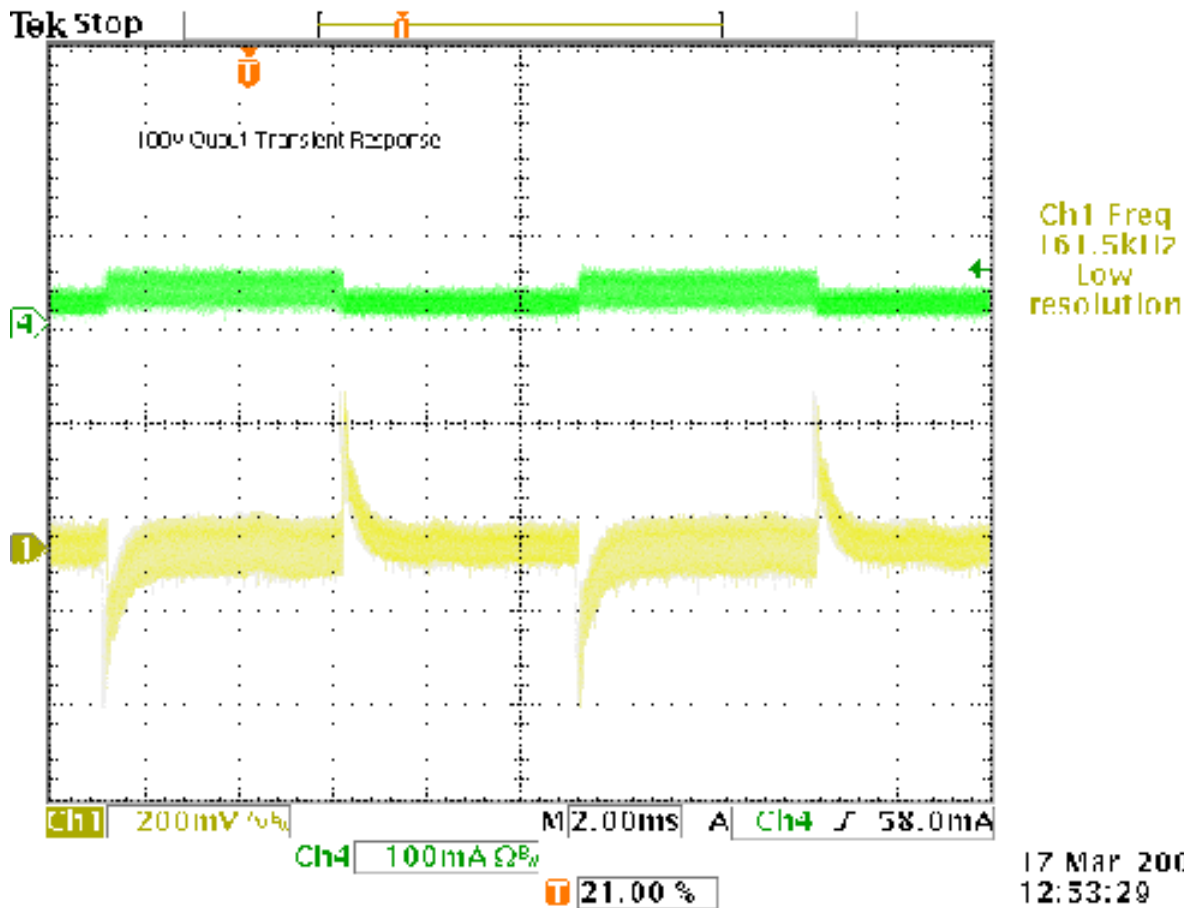


FIGURE 7. NSC0288-Switch node



PADC_NSC0288_wf_7

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 Fax: +49 (0) 180-530-85-86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 69 9508 6208
 English Tel: +49 (0) 870 24 0 2171
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National Semiconductor Asia Pacific Customer Support Center
 Email: ap.support@nsc.com

National Semiconductor Japan Customer Support Center
 Fax: 81-3-5639-7507
 Email: jpn.feedback@nsc.com
 Tel: 81-3-5639-7560