UNITRODE

Design Note

# UCC3750 Demonstration Board Operating Guidelines

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The UCC3750 demonstration board is designed to illustrate a typical ring generator application using the UCC3750. It is designed to provide a 20Hz, 85V RMS output for loads up to 10 -15 REN with no offset voltage. Accompanying schematics and parts list provide details of the circuit.

To ensure proper operation, apply +5V between VDD and GND inputs. The circuit draws about 45 mA of current and a sinusoidal output of 1Vpp (centered around 3V) should appear at pin 9 of the UCC3750. The frequency of the sinusoid is set by the DIP switches(SW1). With S1 and S2 in the ON (down) position, a 20Hz signal is obtained. With other settings of these switches (as per datasheet information), other frequencies can be obtained. Please note that it can take about 3 seconds for the crystal oscillator to stabilize after power-up or a change in setting.

The power stage can be evaluated by applying the input voltage (40V - 60V) across VIN and RTN. The VB terminal should be connected to GND for zero offset. For true isolation, the input voltage return and VDD ground should be separate. The output voltage can be observed (and load connected) across terminals labeled VOUT and GND.

The AC current limit for the board is presently disabled by shorting pins 13 and 14. It can be set at 150mA by removing the short. In an AC limit condition, the sine-wave reference is attenuated and the output AC level goes down for 5 cycles. However, there can be a transient overshoot that can make the output temporarily saturate before the current limit sets in. The DC limit is set for +/-500 mA and is sufficient for most situations. The AC limit circuit is noise sensitive and needs proper filtering if it is enabled. Based on the value of R8, C24 should be chosen to introduce a pole just above the ring frequency in order to minimize any high frequency noise. Also, introducing a scope probe at pin 13 can cause the circuit to go into AC limit.

For different output voltage levels and offset requirements, values of R10-R15 will need to be changed along with the compensation. -48V operation based on the VB input may necessitate higher values of C16 and a smaller R15. Please refer to the applications section of the datasheet for further information. With certain capacitive loads, the output voltage waveform can see distortion in modes 2 and 4. This distortion can be minimized by using a transformer with lower magnetizing inductance (with the associated penalty of higher peak currents).

**UC3750 Demo Board Parts List**

| Reference Designator | Part Number/Type | Manufacturer | Part Description |
|---|---|---|---|
| CR1 | BYV99 | Philips | |
| CR2, CR3 | BYV26C | Philips | 600V, 1A, 30ns |
| CR4 | Short w/ jumper | | |
| CR5 - CR12 | 1N5818 | Diodes, Inc. | 30V, 1A Schottky |
| Q1 | IRF640 | IR | 200V, 0.18Ω |
| Q2 | MTP2P50 | Motorola | 500V, p-channel |
| Q3 | IRF840 | IR | 500V, 0.85Ω |
| Q4 | 2N7001 | Diodes Inc. | 60V, 1.2Ω |
| Q5 | 2N5457 | National | n-channel JFET |
| Q6 | MPSA06 | National | npn - 80V, 50mA |
| C1, C2 | HFS series, Aluminum | Panasonic | 100μF, 63V |
| C3 | Film | Panasonic | 0.1μF, 50V |

**UC3750 Demo Board Parts List (cont.)**

| Reference Designator | Part Number/Type | Manufacturer | Part Description |
|---|---|---|---|
| C4 | ECQ-E(F) | Panasonic | 1µF, 250V |
| C5, C9 | Film | Panasonic | 0.47µF, 50V |
| C6 | Film | Panasonic | 0.1µF, 50V |
| C7 | Ceramic | Panasonic | 470 pF, 63V |
| C8 | Film | Panasonic | 1µF, 50V |
| C10, C16 | Ceramic/Tantalum | Panasonic | 2.2µF, 50V/25V |
| C11, C12 | Ceramic | Panasonic | 0.22µF, 50V |
| C13 | Ceramic | Panasonic | 1µF, 63V |
| C14 | Ceramic | Panasonic | 1000 pF, 50V |
| C15 | Omit | | |
| C17 | Film | Panasonic | 0.047µF, 50V |
| C18 | KA Series - Aluminum | Panasonic | 22µF, 16V |
| C19 | KA Series - Aluminum | Panasonic | 100µF, 16V |
| C20, C21 | Omit (short) | | 0Ω |
| C22 | Ceramic | Panasonic | 1nF, 500V, 10% |
| C23 | Film | Panasonic | 0.47µF, 63V |
| C24 | Ceramic | Panasonic | 3.3nF, 50V |
| T1 | CTX08-13484-X1 | Coiltronics | Power Transformer |
| T2 | CTX08-13619-X1 | Coiltronics | Gate Drive Transformer |
| U1 | UCC3750N | Unitrode | |
| R1, R2, R6, R18, R25 | | | 10k |
| R3, R16, R17, R23 | | | 4.7Ω |
| R4 | | | 16.2k |
| R5 | | | 30.1k |
| R7 | | | 100k |
| R8 | | | 0.0k |
| R9 | | | 1Ω, 1W |
| R10 | | | 200k |
| R11, R20, R21 | | | 1M |
| R12 | | | 3.32k |
| R13 | | | 61.9k |
| R14 | | | 374k |
| R15 | | | 15k |
| R19 | | | Not used |
| R22 | | | 1k |
| R24 | | | Omitted |
| R26 | | | 560k |
| R27 | | | 300k |

**UC3853 Demo Board Parts List (cont.)**

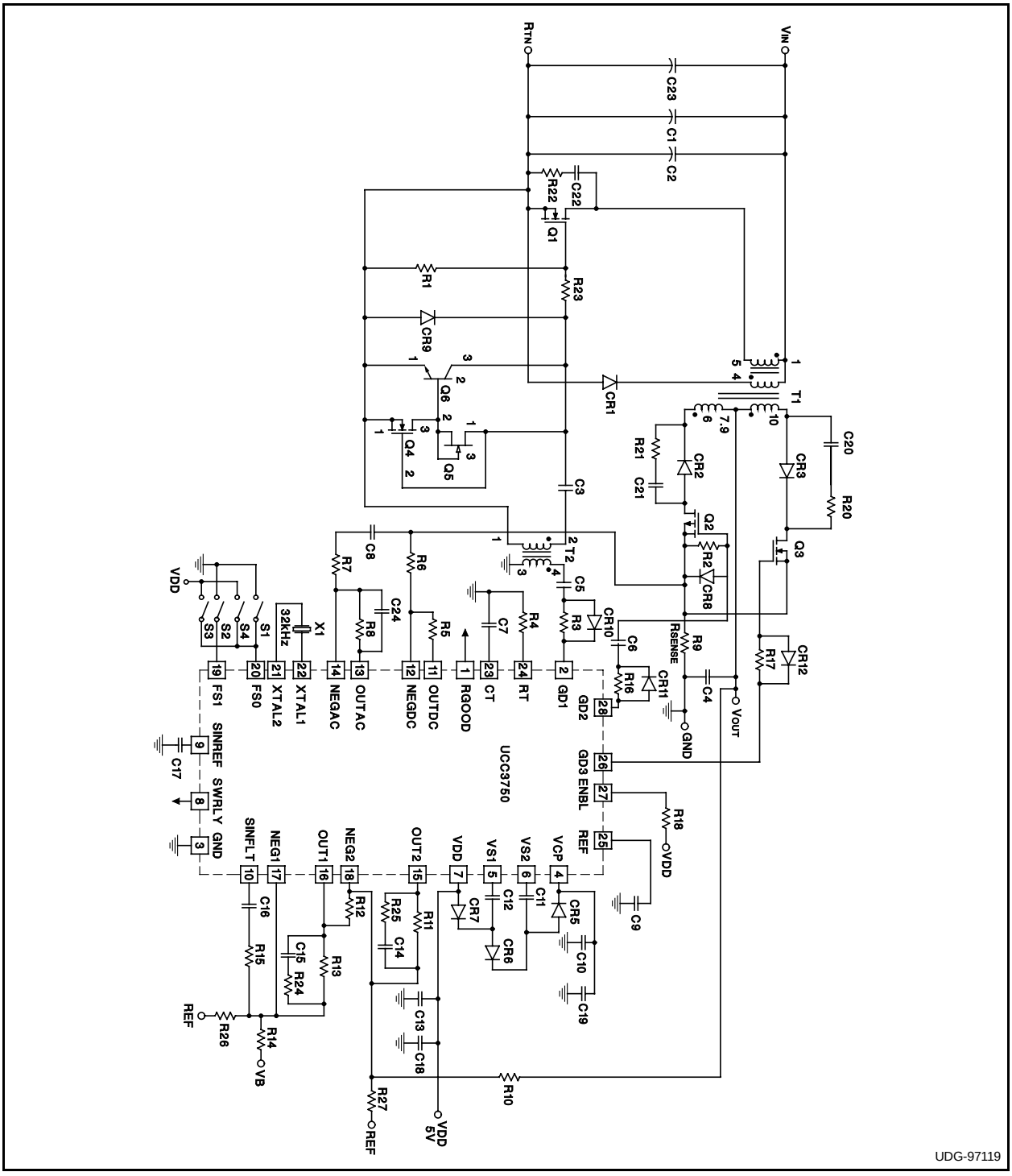


**Figure 1. UCC3750 Demonstration Board Schematic**

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