



UC1724  
UC2724  
UC3724

# Isolated Drive Transmitter

## FEATURES

- 500mA Output Drive, Source or Sink
- 8 to 35V Operation
- Transmits Logic Signal Instantly
- Programmable Operating Frequency
- Under-Voltage Lockout
- Able To Pass DC Information Across Transformer
- Up To 600kHz Operation

## DESCRIPTION

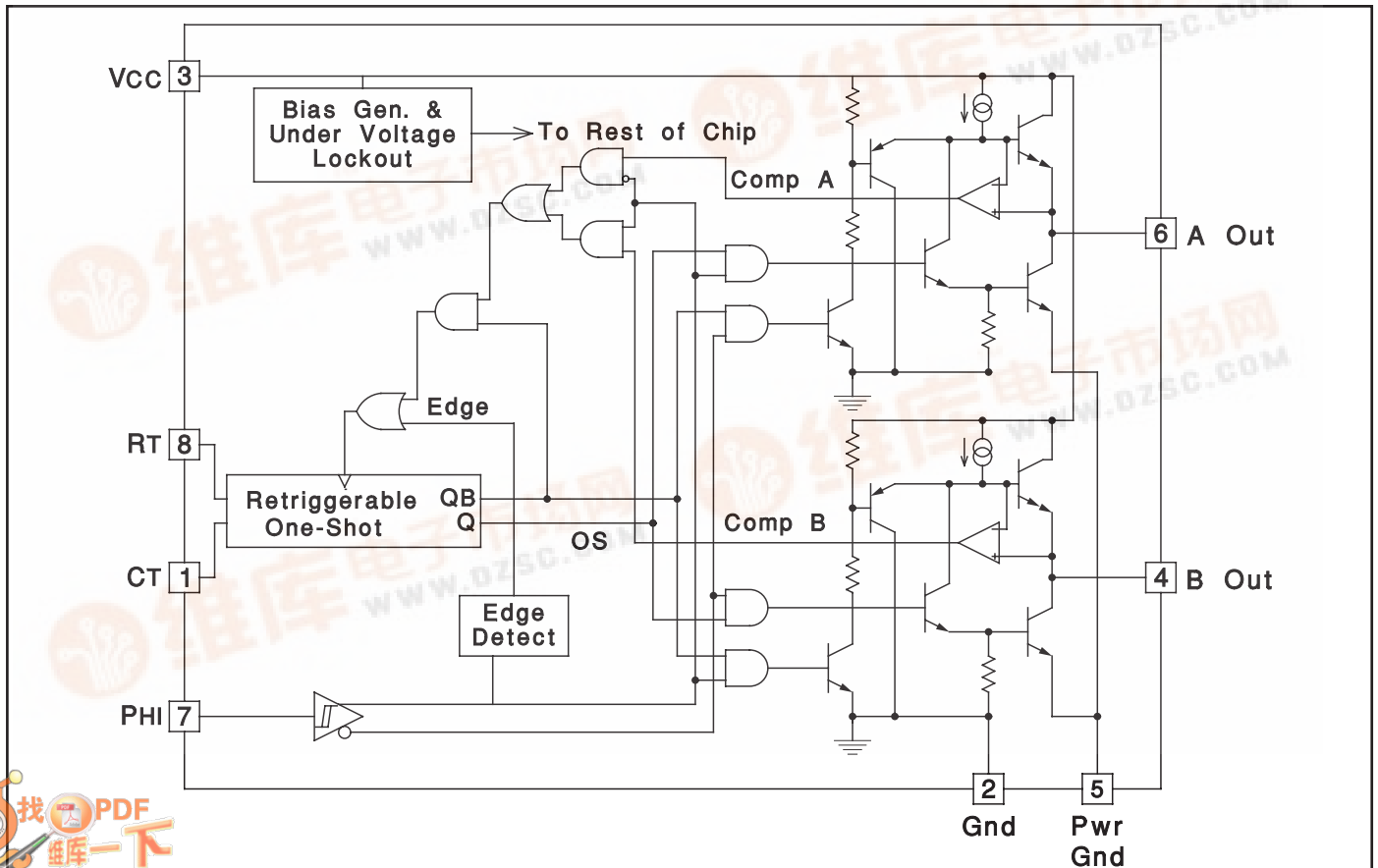
The UC1724 family of Isolated Drive Transmitters, along with the UC1725 Isolated Drivers, provide a unique solution to driving isolated power MOSFET gates. They are particularly suited to drive the high-side devices on a high-voltage H-bridge. The UC1724 devices transmit drive logic, and drive power, to the isolated gate circuit using a low cost pulse transformer.

This drive system utilizes a duty-cycle modulation technique that gives instantaneous response to the drive control transistions, and reliably passes steady-state, or DC, conditions. High frequency operation, up to 600kHz, allows the cost and size of the coupling transformer to be minimized.

These devices will operate over an 8 to 35 Volt supply range. The dual high current totem pole outputs are disabled by an uder-voltage lockout circuit to prevent spurious responses during startup or low voltage conditions.

These devices are available in 8 pin plastic or ceramic dual-inline packages, as well as 16 pin SOIC package.

## BLOCK DIAGRAM



Note: Pin numbers refer to DIL-8 packages.



### ABSOLUTE MAXIMUM RATINGS

|                                                     |                           |
|-----------------------------------------------------|---------------------------|
| Supply Voltage $V_{IN}$ . . . . .                   | 40V                       |
| Source/Sink Current (Pulsed) . . . . .              | 1A                        |
| Source/Sink Current (Continuous) . . . . .          | 0.5A                      |
| Output Voltage (Pins 4, 6). . . . .                 | -0.3 to $(V_{IN} + 0.3)V$ |
| PHI, RT, and CT inputs (Pins 1, 7, and 8) . . . . . | -0.3 to 6V                |
| Operating Junction Temperature (Note 2) . . . . .   | 150°C                     |
| Storage Temperature Range . . . . .                 | -65°C to 150°C            |
| Lead Temperature (Soldering, 10 Seconds) . . . . .  | 300°C                     |

**Note 1:** All voltages are with respect to GND (Pin 2); all currents are positive into, negative out of part.

**Note 2:** Consult Unitorde Integrated Circuit Databook for thermal limitations and considerations of package.

**Note 3:** Pin numbers refer to DIL-8 packages.

### RECOMMENDED OPERATION CONDITIONS

|                                                  |                             |
|--------------------------------------------------|-----------------------------|
| Input Voltage . . . . .                          | +9V to +35V                 |
| Sink/Source Load Current (each output) . . . . . | 0 to 500mA                  |
| Timing Resistor. . . . .                         | 2k $\Omega$ to 10k $\Omega$ |
| Timing Capacitor . . . . .                       | 300pF to 3nF                |
| Operating Temperature Range (UC1724) . . . . .   | -55°C < $T_A$ < 125°C       |
| Operating Temperature Range (UC3724) . . . . .   | 0°C < $T_A$ < 70°C          |

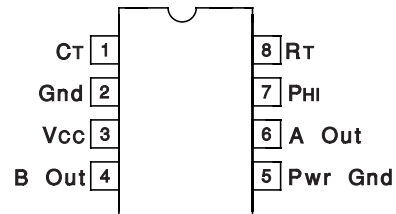
**Note 4:** Range over which the device is functional and parameter limits are guaranteed.

### ORDERING INFORMATION

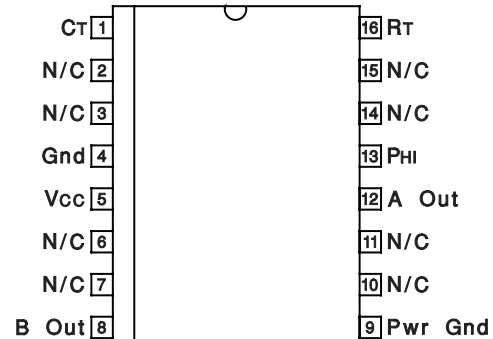
|          | TEMPERATURE RANGE | PACKAGE   |
|----------|-------------------|-----------|
| UC1724J  | -55°C to +125°C   | CDIP      |
| UC2724DW | -25°C to +85°C    | SOIC-Wide |
| UC2724N  |                   | PDIP      |
| UC3724DW | 0°C to +70°C      | SOIC-Wide |
| UC3724N  |                   | PDIP      |

### CONNECTION DIAGRAMS

**DIL-8 (Top View)  
J Or N Package**



**SOIC-16 (Top View)  
DW Package**



**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated,  $V_{CC} = 20V$ ,  $R_T = 4.3k\Omega$ ,  $C_T = 1000pF$ , no load on any output and these specifications apply for: -55°C <  $T_A$  < 125°C for the UC1724, -25°C <  $T_A$  < 85°C for the UC2724, and 0°C <  $T_A$  < 70°C for the UC3724.  $T_A = T_J$ .

| PARAMETER                     | TEST CONDITIONS                             | MIN  | TYP  | MAX  | UNITS   |
|-------------------------------|---------------------------------------------|------|------|------|---------|
| <b>Under-Voltage Lockout</b>  |                                             |      |      |      |         |
| Start-Up Threshold            | $V_{IN}$ Rising                             |      | 7.75 | 9.5  | V       |
| Threshold Hysteresis          |                                             | 0.4  | 1.0  | 1.5  | V       |
| <b>Retriggerable One-Shot</b> |                                             |      |      |      |         |
| Initial Accuracy              | $T_J = 25^\circ C$                          | 1.54 | 1.9  | 2.25 | $\mu s$ |
| Temperature Stability         | Over Operating $T_J$                        | 1.0  |      | 2.9  | $\mu s$ |
| Voltage Stability             | $V_{IN} = 10$ to 35V                        |      | 0.2  | 0.5  | %/V     |
| Operating Frequency           | $L_{LOAD} = 1.4mH$                          | 100  | 150  | 200  | kHz     |
| Minimum Pulse Width           | $R_T = 2k$ $C_T = 300pF$                    | 100  | 500  | 1200 | ns      |
| Operating Frequency           | $R_T = 2k$ $C_T = 300pF$ $L_{LOAD} = 1.4mH$ | 500  | 750  | 1100 | kHz     |

**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated,  $V_{CC} = 20V$ ,  $R_T = 4.3k\Omega$ ,  $C_T = 1000pF$ , no load on any output and these specifications apply for:  $-55^{\circ}C < T_A < 125^{\circ}C$  for the UC1724,  $-25^{\circ}C < T_A < 85^{\circ}C$  for the UC2724, and  $0^{\circ}C < T_A < 70^{\circ}C$  for the UC3724.  $T_A = T_J$ .

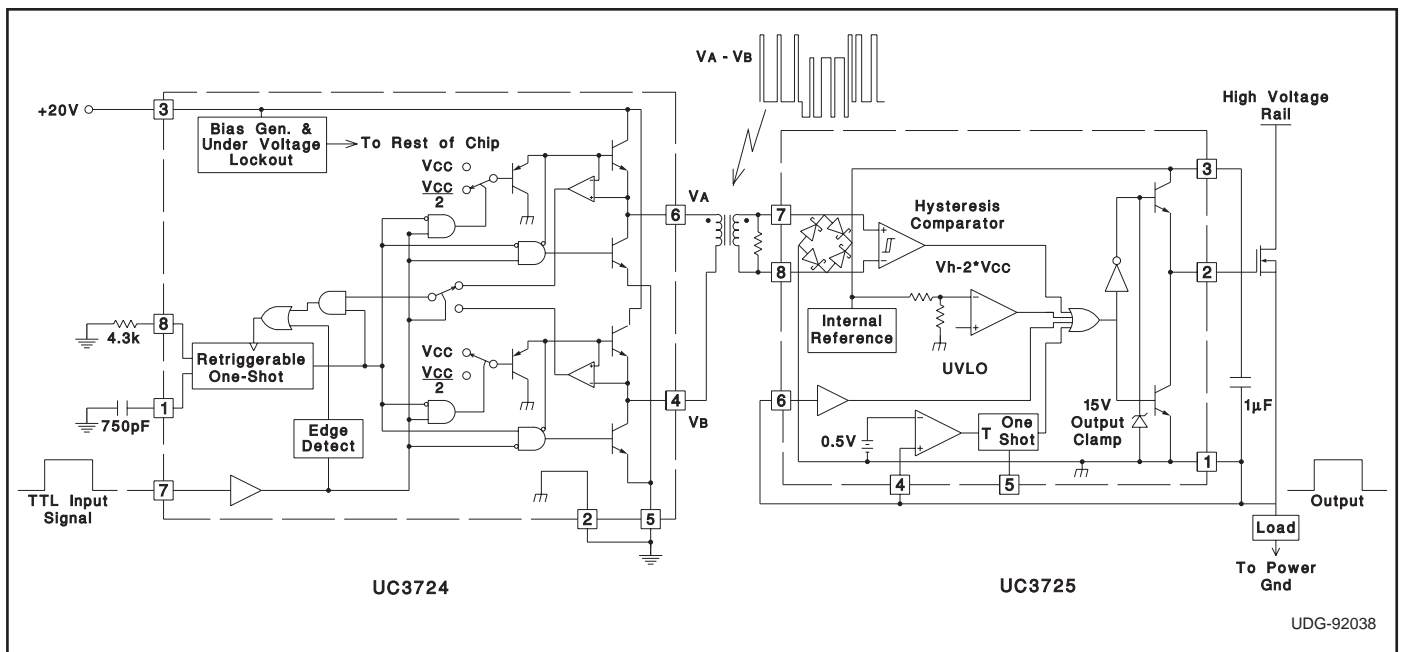
| PARAMETER                                 | TEST CONDITIONS       | MIN  | TYP  | MAX | UNITS   |
|-------------------------------------------|-----------------------|------|------|-----|---------|
| <b>Phi Input (Control Input)</b>          |                       |      |      |     |         |
| HIGH Input Voltage                        |                       | 2.0  |      |     | V       |
| LOW Input Voltage                         |                       |      |      | 0.8 | V       |
| HIGH Input Current                        | $V_{IH} = +2.4V$      | -220 | -130 |     | $\mu A$ |
| LOW Input Current                         | $V_{IL} = +0.4V$      | -600 | -300 |     | $\mu A$ |
| Delay to One-Shot                         |                       |      |      | 350 | ns      |
| Delay to Output                           |                       |      |      | 250 | ns      |
| <b>Output Drivers</b>                     |                       |      |      |     |         |
| Output Low Level                          | $I_{SINK} = 50mA$     |      | 0.3  | 0.4 | V       |
|                                           | $I_{SINK} = 250mA$    |      | 0.5  | 2.1 | V       |
| Output High Level (Volts Below $V_{CC}$ ) | $I_{SOURCE} = 50 mA$  |      | 1.5  | 2.1 | V       |
|                                           | $I_{SOURCE} = 250 mA$ |      | 1.7  | 2.5 | V       |
| Rise/Fall Time                            | No load               |      | 30   | 90  | ns      |
| <b>Total Supply Current</b>               |                       |      |      |     |         |
| Supply Current                            | $C_T = 1.4V$          |      | 15   | 30  | mA      |

**Additional Information**

Please refer to the following Unitorde application topics.

[1] Application Note U-127, *Unique Chip Pair Simplified Isolated High-Side Switch Drive* by John A. O'Connor.

[2] Design Note DN-35, *IGBT Drive Using MOSFET Gate Drivers* by John A. O'Conner.



**Figure 1. Typical application**

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