

## COUNTDOWN POWER TIMER

The ULQ2436M is a rugged, long-duration countdown timer specifically designed to operate in an automotive or industrial environment. It uses an internal RC oscillator to drive a digital countdown circuit for timing periods of typically 2-1/2 to 5 minutes. The ULQ2436M multiplies the oscillator period by 4064. Internal logic can automatically cause the timeout to be halved for successive timeouts. I<sup>2</sup>L technology is used for the countdown and logic circuitry and conventional linear bipolar devices for the oscillator and output power functions. This combination, together with the low-cost 8-pin mini-DIP plastic package, results in a very economical power timer suitable for a wide variety of applications.

The Darlington-connected output driver is capable of switching loads up to 400 mA.

### FEATURES

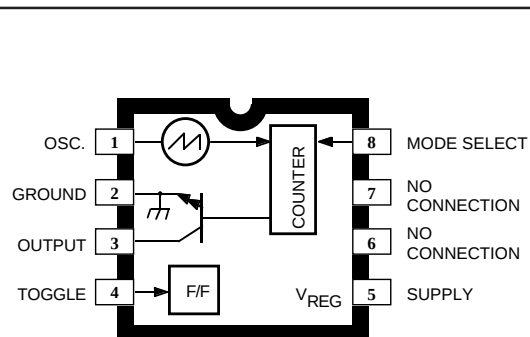
- 28 V/400 mA Output Switch
- Low-Cost Ceramic Timing Capacitor
- Dual-Mode Timing Operation
- -40°C to +85°C Operation
- 10 V to 16 V Operation
- Internal Stabilizing Regulator
- Low-Cost 8-Pin Mini-DIP

### APPLICATIONS

- Automotive Rear-Window Defogger Timer
- Automotive Courtesy Light Timer
- Appliance Power Timer
- Power Control System

### ABSOLUTE MAXIMUM RATINGS at T<sub>A</sub> = +25°C

|                                                                |                 |
|----------------------------------------------------------------|-----------------|
| Supply Current, I <sub>REG</sub> .....                         | 15 mA           |
| Output Voltage, V <sub>OUT</sub> .....                         | 28 V            |
| Output Current, I <sub>OUT</sub> .....                         | 400 mA          |
| Input Voltage, V <sub>1</sub> or V <sub>4</sub> (2 min.) ..... | 24 V            |
| (continuous) .....                                             | 16 V            |
| Package Power Dissipation,<br>P <sub>D</sub> .....             | See Graph       |
| Operating Temperature Range,<br>T <sub>A</sub> .....           | -40°C to +85°C  |
| Storage Temperature Range,<br>T <sub>S</sub> .....             | -65°C to +150°C |

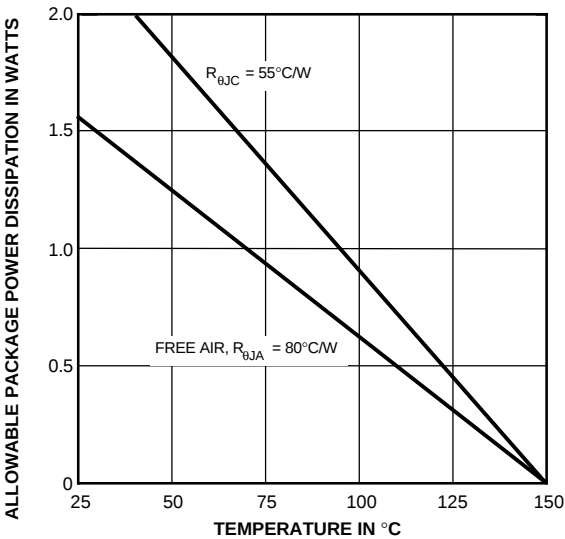


Dwg. No. PS-016

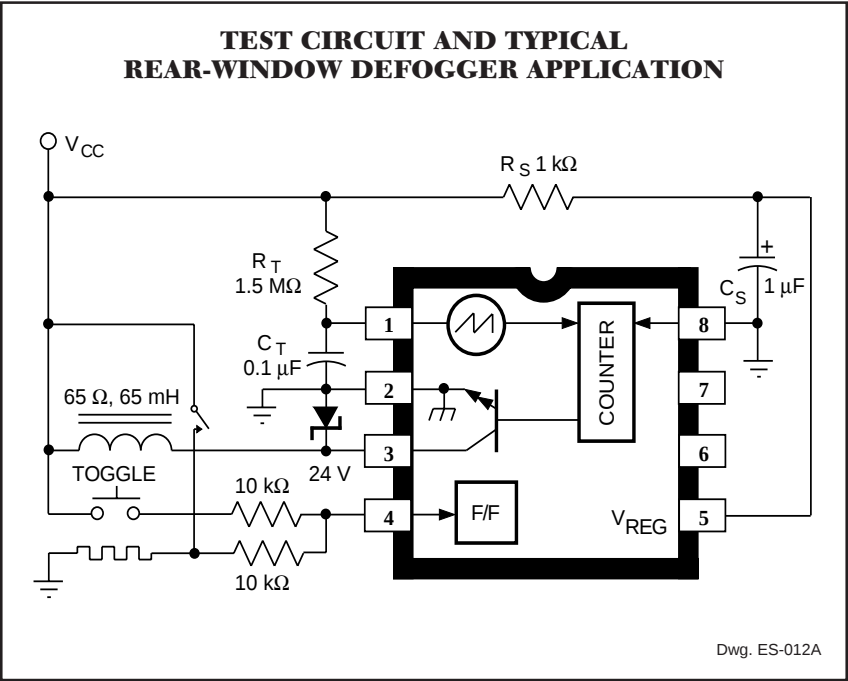
Always order by complete part number: **ULQ2436M**.

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Dwg. GP-009-1B



### ELECTRICAL SPECIFICATIONS at $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , $V_{CC} = 12\text{ V}$ (unless otherwise specified).

| Characteristic                                               | Test Conditions                                          | Limits |      |       |
|--------------------------------------------------------------|----------------------------------------------------------|--------|------|-------|
|                                                              |                                                          | Min.   | Max. | Units |
| Regulator Voltage                                            | $I_{REG} = 12\text{ mA}$ , Output Off                    | 7.0    | 9.0  | V     |
| Output Saturation Voltage                                    | $I_{OUT} = 400\text{ mA}$ , $T_A = +25^{\circ}\text{C}$  | —      | 2.5  | V     |
|                                                              | $I_{OUT} = 250\text{ mA}$ , $T_A = +25^{\circ}\text{C}$  | —      | 1.35 | V     |
| Output Leakage Current                                       | $V_{OUT} = 28\text{ V}$ , $V_{CC} = 12\text{ V}$         | —      | 100  | μA    |
|                                                              | $V_{OUT} = 22\text{ V}$ , $V_{CC} = \text{Open Circuit}$ | —      | 100  | μA    |
| Input Threshold Voltage                                      | 10 kΩ Series Resistor                                    | 1.0    | 5.0  | V     |
| Oscillator Tolerance                                         | $T_A = +25^{\circ}\text{C}$                              | —      | ±3.0 | %     |
|                                                              | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$     | —      | ±6.0 | %     |
| Divider Count<br>( $V_{CC} = 10\text{ V}$ to $16\text{ V}$ ) | Initial Timeout                                          | 4064   | 4064 | —     |
|                                                              | Subsequent Timeouts                                      | 2032   | 2032 | —     |

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### CIRCUIT DESCRIPTION

**OSC.** An external resistor in the range of 200 k $\Omega$  to 2 M $\Omega$  and an external capacitor in the range of 0.001  $\mu$ F to 1  $\mu$ F determine the frequency of the internal oscillator. The period of oscillation is nominally  $R_T C_T$  with the overall output time period (after the digital countdown) of

$$t = 4064 R_T C_T$$

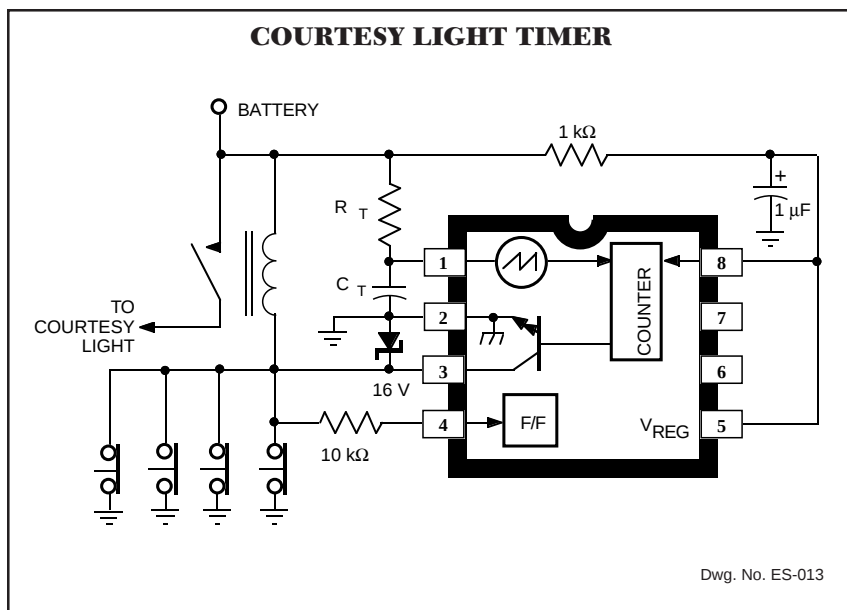
where  $t$  is in seconds. See also MODE SELECT.

**OUTPUT.** The output is an open-collector of a Darlington-connected transistor. The output is ON (low) during the timing period. An external Zener diode is used to protect the output against inductive-load switching transients and automotive "load dump".

**TOGGLE.** A push-button, momentary-action switch at this input toggles the timer from the OFF to the ON state. The oscillator and countdown circuitry are started on the rising edge of the input pulse. Internal de-bounce circuitry is included.

**SUPPLY.** The timer requires a supply current applied to this pin through a current-limiting resistor ( $R_S$ ). An internal 8 volt Zener diode shunt regulator provides a stable supply to the device over wide supply voltage variations. Capacitor  $C_S$  is used to provide decoupling.

**MODE SELECT.** With MODE SELECT connected to GROUND, the first activation will run for the preset time delay. All activations after the first will time out at half of the initial preset time. This sequence is reset each time the supply is interrupted. With MODE SELECT connected to SUPPLY ( $V_{REG}$ ), the timer will repeat the preset time delay each time it is activated.



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