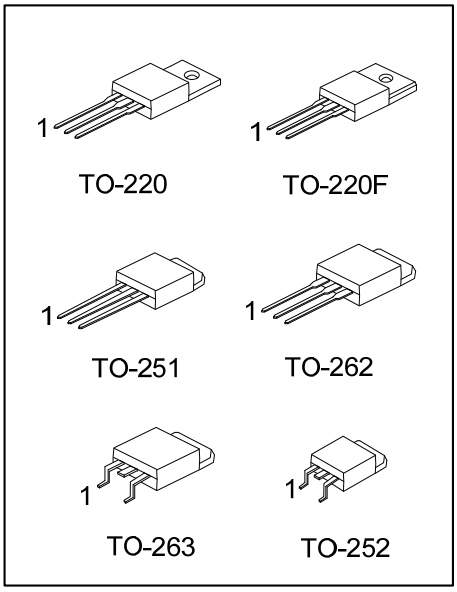
# UGV3040

***Insulated Gate Bipolar Transistor***

## 300mJ, 400V N-CHANNEL IGNITION IGBT




## ■ DESCRIPTION

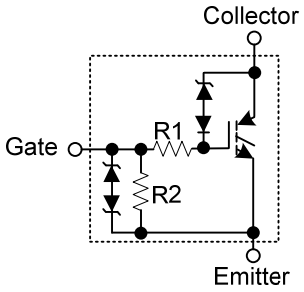
The UTC **UGV3040** is an N-channel ignition Insulated Gate Bipolar Transistor. It uses UTC's advanced technology to provide customers with outstanding SCIS capability.

The UTC **UGV3040** is suitable for Coil –On plug applications and Automotive Ignition Coil driver circuits, etc.

## ■ FEATURES

* Outstanding SCIS capability
* Logic level gate drive

## ■ SYMBOL



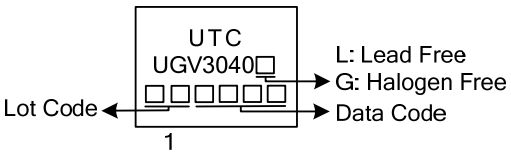

## ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UGV3040L-TA3-T | UGV3040G-TA3-T | TO-220 | G | C | E | Tube |
| UGV3040L-TF3-T | UGV3040G-TF3-T | TO-220F | G | C | E | Tube |
| UGV3040L-TM3-T | UGV3040G-TM3-T | TO-251 | G | C | E | Tube |
| UGV3040L-TN3-R | UGV3040G-TN3-R | TO-252 | G | C | E | Tape Reel |
| UGV3040L-T2Q-T | UGV3040G-T2Q-T | TO-262 | G | C | E | Tube |
| UGV3040L-TQ2-T | UGV3040G-TQ2-T | TO-263 | G | C | E | Tube |
| UGV3040L-TQ2-R | UGV3040G-TQ2-R | TO-263 | G | C | E | Tape Reel |

Note: Pin Assignment: G: Gate C: Collector E: Emitter

| | |
|---|---|
| UGV3040G-TA3-T<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) T: Tube, R: Tape Reel<br>(2) TA3: TO-220, TF3: TO-220F, TM3: TO-251<br>TN3: TO-252, T2Q: TO-262, TQ2: TO-263<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

■ MARKING



## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Collector to Emitter Breakdown Voltage | | $BV_{CER}$ | 450 | V |
| Emitter to Collector Voltage Reverse Battery Condition | | $BV_{ECS}$ | 30 | V |
| At Starting | $T_J$=25°C, $I_{SCIS}$=14.2A, L=3.0mHy | $E_{SCIS}$ | 300 | mJ |
| | $T_J$= 150°C, $I_{SCIS}$=10.6A, L=3.0mHy | | 170 | mJ |
| Continuous Collector Current | $T_C$=25°C | $I_C$ | 21 | A |
| | $T_C$=110°C | | 17 | A |
| Gate to Emitter Voltage Continuous | | $V_{GEM}$ | ±10 | V |
| Power Dissipation Total at $T_C$=25°C | TO-220/TO-262 TO-263 | $P_D$ | 125 | W |
| | TO-220F | | 41.6 | |
| | TO-251/TO-252 | | 125 | |
| Power Dissipation Derating $T_C$>25°C | TO-220/TO-262 TO-263 | | 1 | W/°C |
| | TO-220F | | 0.332 | |
| | TO-251/TO-252 | | 1 | |
| Electrostatic Discharge Voltage at 100pF, 1500Ω | | ESD | 4 | kV |
| Junction Temperature | | $T_J$ | -40 ~ +175 | °C |
| Storage Temperature Range | | $T_{STG}$ | -40 ~ +175 | °C |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ THERMAL CHARACTERISTICS

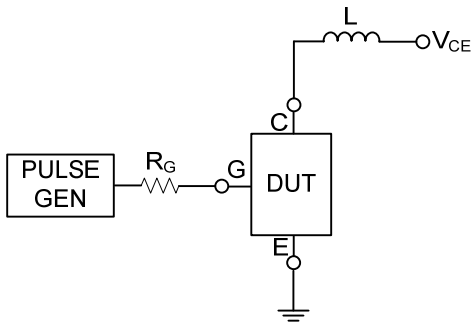
| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Case | TO-220/TO-251 TO-252/TO-262 TO-263 | $\theta_{JC}$ | 1.0 | °C/W |
| | TO-220F | | 3.0 | |

## ■ ELECTRICAL CHARACTERISTICS ($T_A$=25°C, unless otherwise specified)

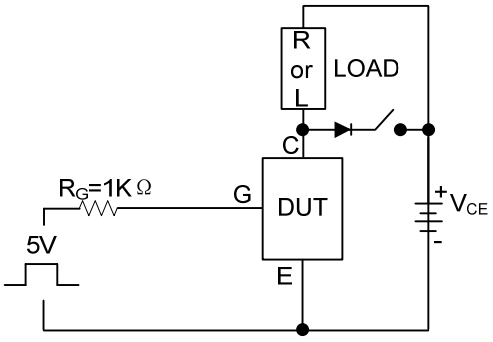
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **Off State Characteristics** | | | | | | | |
| Collector to Emitter Breakdown Voltage | $BV_{CER}$ | $I_C$=2mA, $V_{GE}$=0V, $R_G$=1KΩ, $T_J$=-40~150°C | | 350 | 400 | 450 | V |
| Collector to Emitter to Breakdown Voltage | $BV_{CES}$ | $I_C$=10mA, $V_{GE}$=0V, $R_G$=0, $T_J$=-40~150°C | | 400 | 450 | 500 | V |
| Emitter to Collector Breakdown Voltage | $BV_{ECS}$ | $I_C$=-75mA, $V_{GE}$=0V, $T_C$=25°C | | 30 | | | V |
| Gate to Emitter Breakdown Voltage | $BV_{GES}$ | $I_{GES}$=±2mA | | ±12 | ±14 | | V |
| Collector to Emitter Leakage Current | $I_{CER}$ | $V_{CER}$=250V, $R_G$=1KΩ | $T_C$=25°C | | | 25 | μA |
| | | | $T_C$=150°C | | | 1 | mA |
| Emitter to Collector Leakage Current | $I_{ECS}$ | $V_{EC}$=24V | $T_C$=25°C | | | 1 | mA |
| | | | $T_C$=150°C | | | 40 | mA |
| Series Gate Resistance | $R_1$ | | | | 70 | | Ω |
| Gate to Emitter Resistance | $R_2$ | | | 10K | | 26K | Ω |
| **On State Characteristics** | | | | | | | |
| Collector to Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C$=6A, $V_{GE}$=4V | $T_C$=25°C | | 1.25 | 1.60 | V |
| | | $I_C$=10A, $V_{GE}$=4.5V | $T_C$=150°C | | 1.40 | 1.80 | V |
| | | $I_C$=15A, $V_{GE}$=4.5V | $T_C$=150°C | | 1.90 | 2.20 | V |
| **Dynamic Characteristics** | | | | | | | |
| Gate Charge | $Q_{G(ON)}$ | $I_C$=10A, $V_{CE}$=12V, $V_{GE}$=5V | | | 17 | | nC |
| Gate to Emitter Threshold Voltage | $V_{GE(TH)}$ | $I_C$=1.0mA, $V_{CE}$=$V_{GE}$ | | 1.3 | | 2.2 | V |
| Gate to Emitter Plateau Voltage | $V_{GEP}$ | $I_C$=10A, $V_{CE}$=12V | | | 3.0 | | V |
| **Switching Characteristics** | | | | | | | |
| Current Turn-On Delay Time-Resistive | $t_{d(ON)R}$ | $V_{CE}$=14V, $R_L$=1Ω, $V_{GE}$=5V, $R_G$=1KΩ, $T_J$=25°C | | | 0.48 | 4 | μs |
| Current Rise Time-Resistive | $t_{rR}$ | | | | 2.1 | 7 | μs |
| Current Turn-Off Delay Time-Inductive | $t_{d(OFF)L}$ | | | | 1.4 | 15 | μs |
| Current Fall Time Inductive | $t_{fL}$ | | | | 2.2 | 15 | μs |
| Self Clamped Inductive Switching | SCIS | $T_J$= 25°C, L=3.0mHy, $R_G$=1KΩ, $V_{GE}$=5V | | | | 300 | mJ |

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

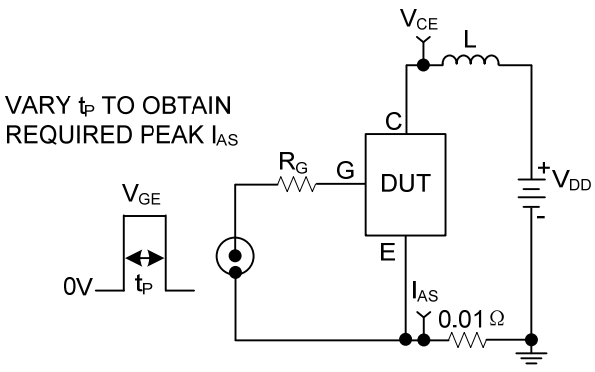
## ■ TEST CIRCUIT AND WAVEFORMS



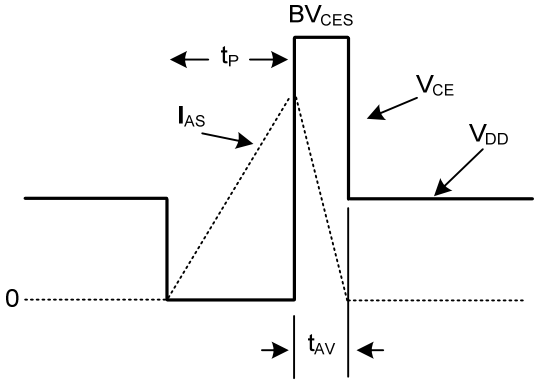

Inductive Switching Test Circuit




$t_{ON}$ and $t_{OFF}$ Switching Test Circuit




Energy Test Circuit




Energy Waveforms