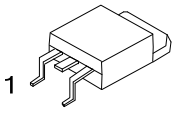
# UPG6N65Z

**Preliminary** ***Insulated Gate Bipolar Transistor***

## 650V, SMPS N-CHANNEL IGBT




TO-252

### ■ DESCRIPTION

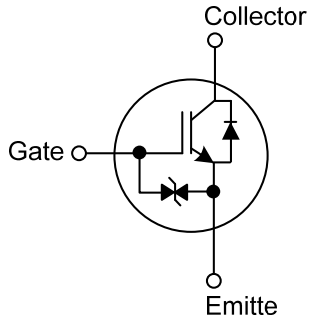
The UTC **UPG6N65Z** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG6N65Z** is suitable for high voltage switching, high frequency switch mode power supplies.

### ■ FEATURES

* High switching speed
* High avalanche ruggedness
* Low saturation voltage: $V_{CE(SAT).Typ.}$=1.8V @ $I_C$=6.0A, $V_{GE}$=15V ($T_C$ = 25°C)
* With ESD Protected

### ■ SYMBOL



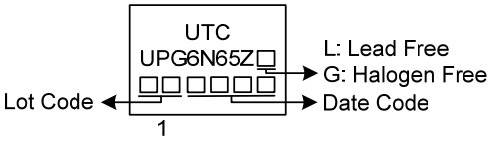

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UPG6N65ZL-TN3-R | UPG6N65ZG-TN3-R | TO-252 | G | C | E | Tape Reel |

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

| | |
|---|---|
| UPG6N65ZG-TN3-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) TN3: TO-252<br>(3) G: Halogen Free and Lead Free L: Lead Free |

### ■ MARKING



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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 650 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±20 | V |
| Transient Gate-emitter voltage ($t_P$ < 5 ms) | | | ±25 | V |
| Continuous Collector Current | $T_C$=25°C | $I_C$ | 12 | A |
| | $T_C$=100°C | | 6 | A |
| Collector Current Pulsed (Note 1) | | $I_{CM}$ | 20 | A |
| Diode Forward Current | $T_C$=25°C | $I_F$ | 12 | A |
| | $T_C$=100°C | | 6 | A |
| Short Circuit Withstand Time<br>$V_{GE}$ = 15V, $V_{CC}$ ≤ 200V<br>Allowed number of short circuits < 1000<br>Time between short circuits: ≥ 1.0s<br>$T_{VJ}$ = 25°C | | $t_{SC}$ | 8 | μs |
| Power Dissipation ($T_C$=25°C) | | $P_D$ | 42 | W |
| Operating Junction Temperature | | $T_J$ | -40 ~ +150 | °C |
| Storage Temperature Range | | $T_{STG}$ | -55 ~ +150 | °C |

Notes: 1. Absolute maximum ratings are stress ratings only and functional device operation is not implied. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
2. Pulse width limited by maximum junction temperature.

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Junction to Case | $\theta_{JC}$ | 2.97 | °C/W |

## ■ ELECTRICAL CHARACTERISTICS ($T_C$=25°C, unless otherwise noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | | |
| Collector-Emitter Breakdown Voltage | $BV_{CES}$ | $I_C$=250μA, $V_{GE}$=0V | | 650 | | | V |
| Collector Cut-Off Current | $I_{CES}$ | $V_{CE}$=650V, $V_{GE}$=0V | | | | 5 | μA |
| G-E Leakage Current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=±20V | | | | ±10 | μA |
| **On Characteristics** | | | | | | | |
| Gate to Emitter Threshold Voltage | $V_{GE(TH)}$ | $I_C$=250μA, $V_{CE}$=$V_{GE}$ | | 4.5 | | 7.5 | V |
| Collector to Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C$=6.0A, $V_{GE}$=15V | $T_C$=25°C | | 1.8 | 2.3 | V |
| | | | $T_C$=125°C | | 2.2 | | V |
| **Dynamic Characteristics** | | | | | | | |
| Input Capacitance | $C_{IES}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1MHz | | | 273 | | pF |
| Output Capacitance | $C_{OES}$ | | | | 42 | | pF |
| Reverse Transfer Capacitance | $C_{RES}$ | | | | 9 | | pF |
| **Switching Characteristics** | | | | | | | |
| Total Gate Charge | $Q_G$ | $V_{CE}$=520V, $I_C$=6.0A, $V_{GE}$=15V | | | 31 | | nC |
| Gate-Emitter Charge | $Q_{GE}$ | | | | 14 | | nC |
| Gate-Collector Charge | $Q_{GC}$ | | | | 9 | | nC |
| Turn-On Delay Time | $t_{DON)}$ | $V_{CC}$=400V, $I_C$=6.0A, $R_G$=25Ω, $V_{GE}$=0~15V, L=500μH | | | 3 | | ns |
| Rise Time | $t_R$ | | | | 12 | | ns |
| Turn-Off Delay Time | $t_{DOFF)}$ | | | | 7 | | ns |
| Fall Time | $t_F$ | | | | 209 | | ns |
| Turn-On Switching Loss | $E_{ON}$ | | | | 0.19 | | mJ |
| Turn-Off Switching Loss | $E_{OFF}$ | | | | 0.16 | | mJ |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Forward Voltage Drop | $V_F$ | $I_F$=6.0A | | | | 2.0 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=6.0A, dI/dt=100A/μS, $V_{CC}$=400V | | | 51 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | | 13 | | nC |