



UF5305

Preliminary

POWER MOSFET

-31A, -55V P-CHANNEL POWER MOSFET

DESCRIPTION

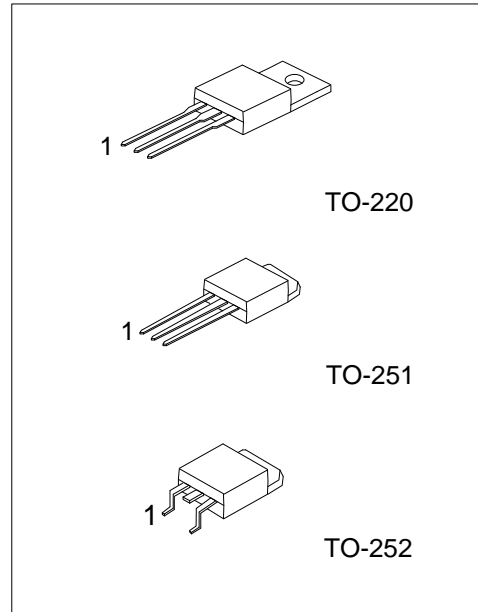
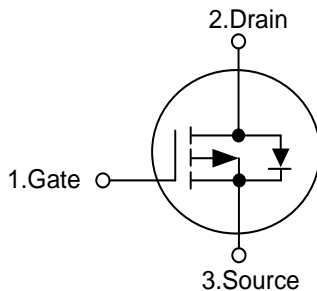
The UTC **UF5305** is a P-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **UF5305** is suitable for all commercial-industrial applications, etc.

FEATURES

- * $R_{DS(ON)} \leq 0.06 \Omega @ V_{GS} = -10V, I_D = -16A$
- * High Switching Speed
- * Dynamic dv/dt Rating

SYMBOL



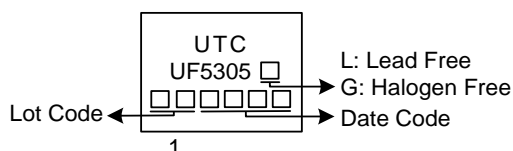
ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|---------------|---------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UF5305L-TA3-T | UF5305G-TA3-T | TO-220 | G | D | S | Tube |
| UF5305L-TM3-T | UF5305G-TM3-T | TO-251 | G | D | S | Tube |
| UF5305L-TN3-T | UF5305G-TN3-T | TO-252 | G | D | S | Tube |
| UF5305L-TN3-R | UF5305G-TN3-R | TO-252 | G | D | S | Tape Reel |

Note: Pin Assignment: G: Gate D: Drain S: Source

| | |
|---|--|
| <p>UF5305G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

MARKING



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT | |
|--|-----------------------|-----------|--------------------------------|------------|----|
| Drain-Source Voltage | | V_{DSS} | -55 | V | |
| Gate-Source Voltage | | V_{GSS} | ± 20 | V | |
| Drain Current | Continuous | I_D | $V_{GS}=-10V, T_C=25^\circ C$ | -31 | A |
| | | | $V_{GS}=-10V, T_C=100^\circ C$ | -22 | A |
| | Pulsed (Note 2) | | I_{DM} | -110 | A |
| Avalanche Current (Note 2) | | I_{AR} | -16 | A | |
| Avalanche Energy | Single Pulse (Note 3) | | E_{AS} | 280 | mJ |
| | Repetitive (Note 2) | | E_{AR} | 11 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | -5.0 | V/ns | |
| Power Dissipation ($T_C=25^\circ C$) | TO-220 | P_D | 110 | W | |
| | TO-251 | | 42 | W | |
| | TO-252 | | | | |
| Junction Temperature | | T_J | -55 ~ +150 | $^\circ C$ | |
| Storage Temperature Range | | T_{STG} | -55 ~ +150 | $^\circ C$ | |

Notes: 1. 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.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $V_{DD}=-25V$, Starting $T_J=25^\circ C$, $L=2.1mH$, $R_G=25\Omega$, $I_{AS}=-16A$

4. $I_{SD}\leq -16A$, $di/dt\leq -280A/\mu s$, $V_{DD}\leq BV_{DSS}$, $T_J\leq 150^\circ C$

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|--------|---------------|-------------|--------------|
| Junction to Ambient | TO-220 | θ_{JA} | 62 | $^\circ C/W$ |
| | TO-251 | | 90 | $^\circ C/W$ |
| | TO-252 | | | |
| Junction to Case | TO-220 | θ_{JC} | 1.1 | $^\circ C/W$ |
| | TO-251 | | 2.97 (Note) | $^\circ C/W$ |
| | TO-252 | | | |

Note: Device mounted on FR-4 substrate P_c board, 2oz copper, with 1inch square copper plate.

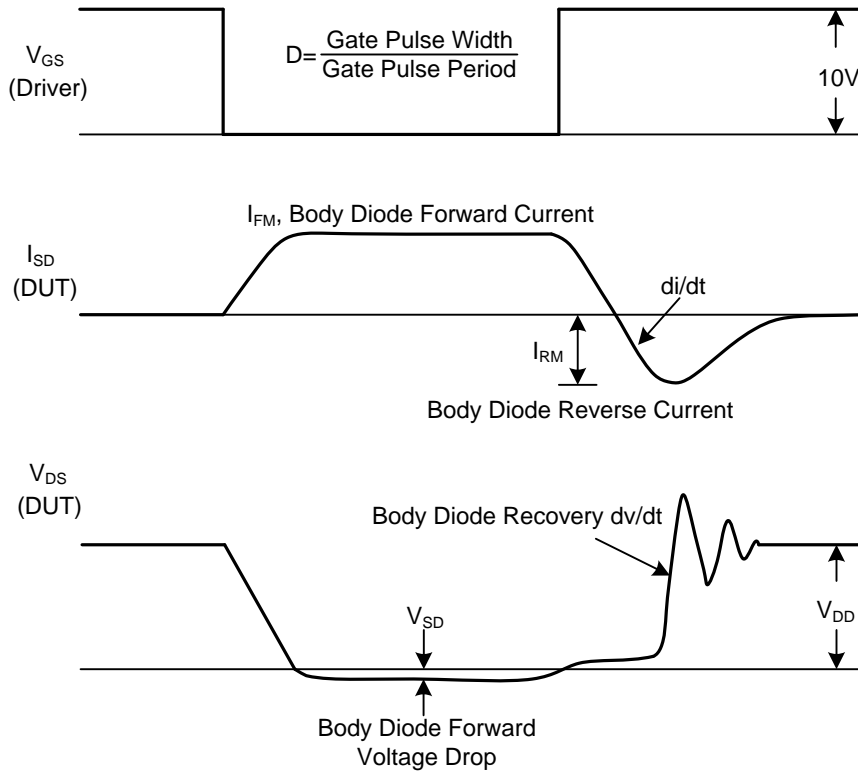
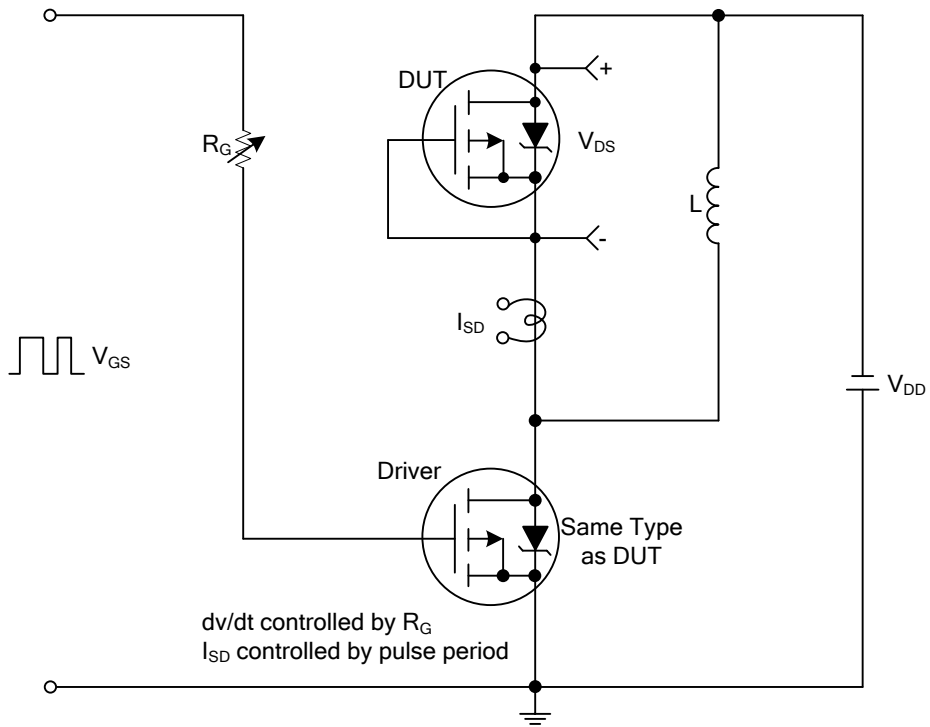
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|-------------------------------------|--|------|--------|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =-250μA | -55 | | | V |
| Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} /ΔT _J | Reference to 25°C, I _D =-1mA | | -0.034 | | V/°C |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =-55V, V _{GS} =0V | | | -25 | μA |
| | | V _{DS} =-44V, V _{GS} =0V, T _J =150°C | | | -250 | μA |
| Gate-Source Leakage Current | Forward | I _{GSS} | | | | nA |
| | Reverse | | | | | |
| | | V _{GS} =-20V, V _{DS} =0V | | | -100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Static Drain-Source On-Resistance | R _{DS(ON)} | V _{GS} =-10V, I _D =-16A (Note 2) | | | 0.06 | Ω |
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} =V _{GS} , I _D =-250μA | -2.0 | | -4.0 | V |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{GS} =0V, V _{DS} =-25V, f=1.0MHz | | 1200 | | pF |
| Output Capacitance | C _{OSS} | | | 520 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 250 | | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q _G | I _D =-16A, V _{DS} =-44V, V _{GS} =-10V (Note 2) | | | 63 | nC |
| Gate-to-Source Charge | Q _{GS} | | | | 13 | nC |
| Gate-to-Drain ("Miller") Charge | Q _{GD} | | | | 29 | nC |
| Turn-ON Delay Time | t _{D(ON)} | V _{DD} =-28V, I _D =-16A, R _G =6.8Ω R _D =1.6Ω (Note 2) | | 14 | | ns |
| Rise Time | t _R | | | 66 | | ns |
| Turn-OFF Delay Time | t _{D(OFF)} | | | 39 | | ns |
| Fall Time | t _F | | | 63 | | ns |
| | | | | | | |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body Diode Continuous Source Current | I _S | | | | -31 | A |
| Maximum Body-Diode Pulsed Current (Note 1) | I _{SM} | | | | -110 | A |
| Drain-Source Diode Forward Voltage | V _{SD} | T _J =25°C, I _S =-16A, V _{GS} =0V (Note 2) | | | -1.4 | V |
| Body Diode Reverse Recovery Time | t _{RR} | T _J =25°C, I _F =-16A, | | 71 | 110 | ns |
| Body Diode Reverse Recovery Charge | Q _{RR} | di/dt=-100A/μs (Note 2) | | 170 | 250 | nC |

Notes: 1. Repetitive rating; pulse width limited by max. junction temperature.

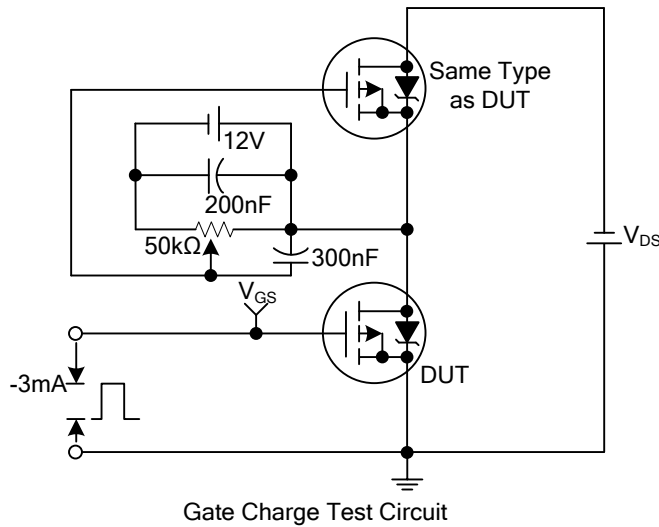
2. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

■ TEST CIRCUITS AND WAVEFORMS

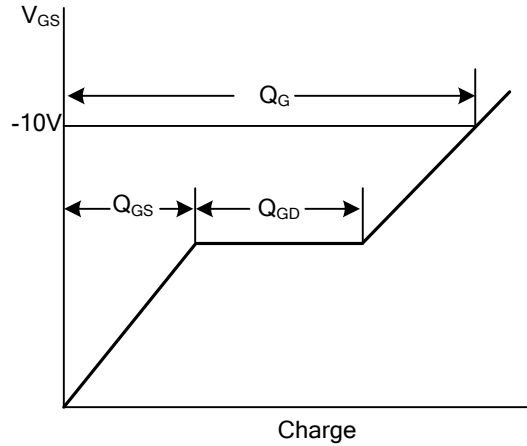


Peak Diode Recovery dv/dt Test Circuit and Waveforms

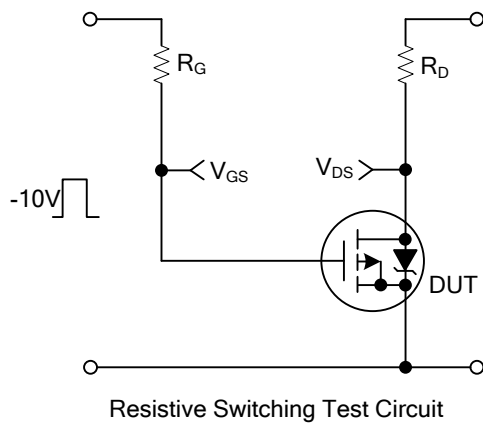
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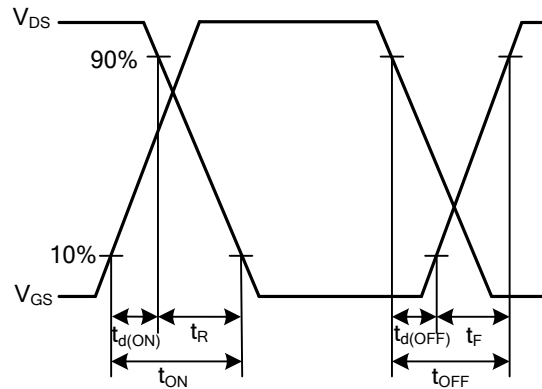
Gate Charge Test Circuit



Gate Charge Waveforms



Resistive Switching Test Circuit



Resistive Switching Waveforms

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