

- 1. TYPE QS5U33
- 2. STRUCTURE SILICON P-CHANNEL MOS FET / SCHOTTKY BARRIER DIODE
- 3. APPLICATIONS SWITCHING
- 4. ABSOLUTE MAXIMUM RATINGS [Ta=25°C]

《 MOSFET 》

| | | | | | |
|----------------------|------------|-----------|-------|--------------|----------------------------|
| DRAIN-SOURCE VOLTAGE | | V_{DSS} | · · · | -30V | |
| GATE-SOURCE VOLTAGE | | V_{GSS} | · · · | ±20V | |
| DRAIN CURRENT | CONTINUOUS | I_D | · · · | ±2.0A | |
| | PULSED | I_{DP} | · · · | ±8.0A | PW ≤ 10 μs DUTY CYCLE ≤ 1% |
| SOURCE CURRENT | CONTINUOUS | I_S | · · · | -0.75A | |
| (BODY DIODE) | PULSED | I_{SP} | · · · | -8.0A | PW ≤ 10 μs DUTY CYCLE ≤ 1% |
| CHANNEL TEMPERATURE | | T_{ch} | · · · | 150°C | |
| POWER DISSIPATION | | P_D | · · · | 0.9W/ELEMENT | MOUNTED ON A CERAMIC BOARD |

《 Di 》

| | | | | | |
|---------------------------------|--|-----------|-------|--------------|----------------------------|
| REPETITIVE PEAK REVERSE VOLTAGE | | V_{RM} | · · · | 25V | |
| REVERSE VOLTAGE | | V_R | · · · | 20V | |
| FORWARD CURRENT | | I_F | · · · | 1.0A | |
| FORWARD CURRENT SURGE PEAK | | I_{FSM} | · · · | 3.0A | 60Hz · 1cyc |
| JUNCTION TEMPERATURE | | T_j | · · · | 150°C | |
| POWER DISSIPATION | | P_D | · · · | 0.7W/ELEMENT | MOUNTED ON A CERAMIC BOARD |

《 MOSFET AND Di 》

| | | | | | |
|-----------------------------|--|-----------|-------|--------------|----------------------------|
| TOTAL POWER DISSIPATION | | P_D | · · · | 1.25W/TOATAL | MOUNTED ON A CERAMIC BOARD |
| RANGE OF STRAGE TEMPERATURE | | T_{stg} | · · · | -55~150°C | |

| | | | | |
|-----------------------------|----------------------------|---------------------------------|-------------------|-----------------------------------|
| DESIGN <i>T. Arizono</i> | CHECK <i>A. Tsubaki</i> | APPROVAL <i>S. Higashida</i> | DATE : 7/DEC/2006 | SPECIFICATION No. TSQ03121-QS5U33 |
| | | | REV. : 0 | ROHM CO., LTD. |

5. ELECTRICAL CHARACTERISTICS [Ta=25°C]
 《 MOSFET 》

| PARAMETER | ITEM | CONDITION | MIN. | TYP. | MAX. |
|---|--------------------------|--|-------|-------|----------------|
| GATE-SOURCE LEAKAGE | I_{GSS} | $V_{GS}=\pm 20V/V_{DS}=0V$ | — | — | $\pm 10 \mu A$ |
| DRAIN-SOURCE BREAKDOWN VOLTAGE | $V_{(BR)DSS}$ | $I_D=-1mA/V_{GS}=0V$ | -30V | — | — |
| ZERO GATE VOLTAGE DRAIN CURRENT | I_{DSS} | $V_{DS}=-30V/V_{GS}=0V$ | — | — | $-1 \mu A$ |
| GATE THRESHOLD VOLTAGE | $V_{GS(th)}$ | $V_{DS}=-10V/I_D=-1mA$ | -1.0V | — | -2.5V |
| STATIC DRAIN-SOURCE ON-STATE RESISTANCE | $R_{DS(on)}$ * PULSED | $I_D=-2A/V_{GS}=-10V$ | — | 95mΩ | 135mΩ |
| | | $I_D=-1A/V_{GS}=-4.5V$ | — | 145mΩ | 205mΩ |
| | | $I_D=-1A/V_{GS}=-4.0V$ | — | 160mΩ | 225mΩ |
| FORWARD TRANSFER ADMITTANCE | $ Y_{fs} $ * PULSED | $V_{DS}=-10V/I_D=-1A$ | 1.4S | — | — |
| INPUT CAPACITANCE | C_{iss} | $V_{DS}=-10V/V_{GS}=0V$ $f=1MHz$ | — | 310pF | — |
| OUTPUT CAPACITANCE | C_{oss} | | — | 55pF | — |
| REVERSE TRANSFER CAPACITANCE | C_{rss} | | — | 45pF | — |
| TURN-ON DELAY TIME | $t_{d(on)}$ * PULSED | $I_D=-1A$ | — | 7nS | — |
| RISE TIME | t_r * PULSED | $V_{DD}\doteq -15V$ $V_{GS}=-10V$ | — | 6nS | — |
| TURN-OFF DELAY TIME | $t_{d(off)}$ * PULSED | $R_L\doteq 15\Omega$ $R_G\doteq 10\Omega$ | — | 25nS | — |
| FALL TIME | t_f * PULSED | See Fig. 1-1, 1-2 | — | 6nS | — |
| TOTAL GATE CHARGE | Q_g * PULSED | $V_{DD}\doteq -15V$ $V_{GS}=-5V$ | — | 3.4nC | — |
| GATE-SOURCE CHARGE | Q_{gs} * PULSED | $I_D=-2A$ $R_L\doteq 7.5\Omega$ | — | 1.0nC | — |
| GATE-DRAIN CHARGE | Q_{gd} * PULSED | $R_G\doteq 10\Omega$ See Fig. 2-1, 2-2 | — | 1.3nC | — |

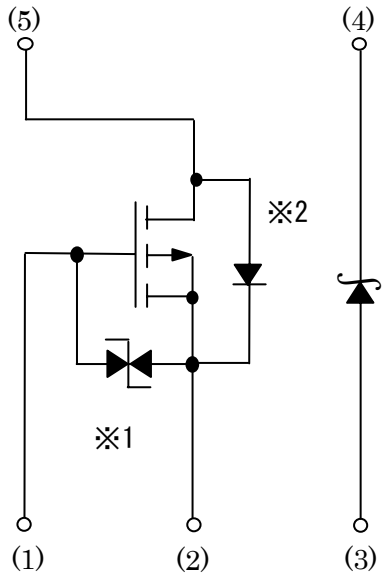
《 MOSFET 》 BODY DIODE (SOURCE-DRAIN)

| PARAMETER | ITEM | CONDITION | MIN. | TYP. | MAX. |
|-----------------|----------|------------------------|------|------|-------|
| FORWARD VOLTAGE | V_{SD} | $I_S=-0.75A/V_{GS}=0V$ | — | — | -1.2V |

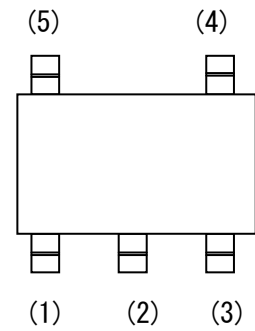
《 Di 》

| PARAMETER | ITEM | CONDITION | MIN. | TYP. | MAX. |
|-----------------|-------|------------|------|------|-------------|
| FORWARD VOLTAGE | V_F | $I_F=1.0A$ | — | — | 0.45V |
| REVERSE CURRENT | I_R | $V_R=20V$ | — | — | 200 μA |

6. INNER CIRCUIT

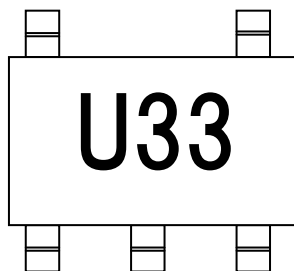


- (1) GATE
- (2) SOURCE
- (3) ANODE
- (4) CATHODE
- (5) DRAIN



- ※ 1 ESD PROTECTION DIODE
- ※ 2 BODY DIODE

7. MARKING



“U33” MEANS QS5U33.

8. MEASUREMENT CIRCUIT

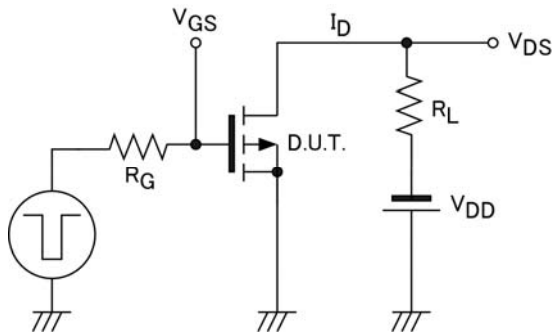


Fig.1-1 SWITCHING TIME MEASUREMENT CIRCUIT

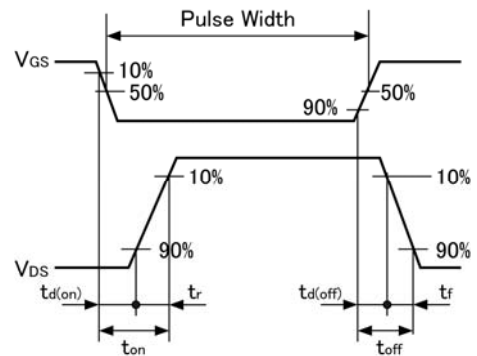


Fig.1-2 SWITCHING WAVEFORMS

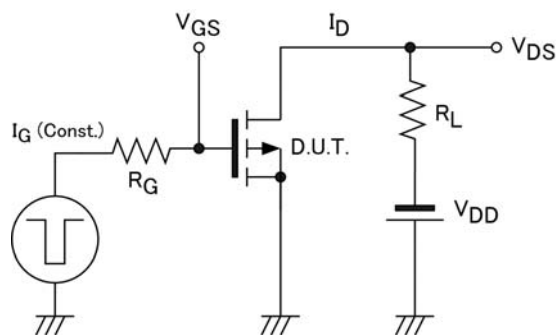


Fig.2-1 GATE CHARGE MEASUREMENT CIRCUIT

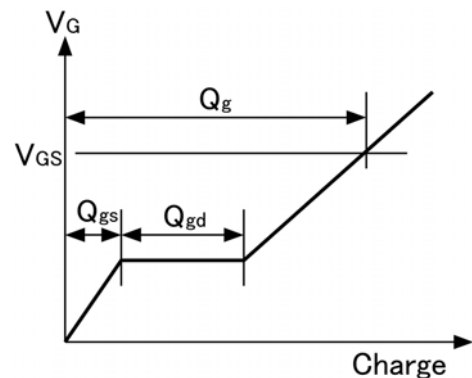


Fig.2-2 GATE CHARGE WAVEFORM

9. Notice

1. SBD has a large reverse leak current compared to other type of diode. Therefore; it would raise a junction temperature, and increase a reverse power loss. Further rise of inside temperature would cause a thermal runaway.

This built-in SBD has low VF characteristics and therefore, higher leak current. Please consider enough the surrounding temperature, generating heat of MOSFET and the reverse current.

2. This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.