# Small Signal Dual N-Channel MOSFET

## FEATURES

- AEC-Q101 Qualified
- Advanced trench cell design
- ESD protected G-S 2kV (HBM)
- RoHS Compliant
- Halogen-free

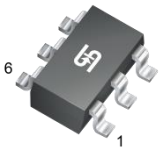
## APPLICATIONS

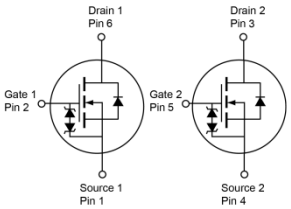
- Switching circuits
- High-speed line driver
- Low-side loadswitch
- Relay driver

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| **PARAMETER** | | **VALUE** | **UNIT** |
| $V_{DS}$ | | 60 | V |
| $R_{DS(on)}$ (max) | $V_{GS}$ = 10V | 1.6 | Ω |
| | $V_{GS}$ = 4.5V | 2 | |
| $Q_g$ | $V_{GS}$ = 4.5V | 0.9 | nC |

Pb-Free RoHS COMPLIANT HALOGEN FREE

**SOT-363**




**Note:** MSL 1 (Moisture Sensitivity Level) per J-STD-020

| **ABSOLUTE MAXIMUM RATINGS** ($T_A$ = 25°C unless otherwise noted) | | | | |
|---|---|---|---|---|
| **PARAMETER** | | **SYMBOL** | **LIMIT** | **UNIT** |
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_A$ = 25°C | $I_D$ | 330 | mA |
| Pulsed Drain Current (Note 1) | | $I_{DM}$ | 1.32 | A |
| Total Power Dissipation | $T_A$ = 25°C | $P_D$ | 337 | mW |
| | $T_A$ = 125°C | | 67 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | - 55 to +150 | °C |

| **THERMAL PERFORMANCE** | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **LIMIT** | **UNIT** |
| Junction to Ambient Thermal Resistance (Note 2) | $R_{\theta JA}$ | 370 | °C/W |

**Notes:**

1. Pulse Width ≤ 100μs.
2. Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

| ELECTRICAL SPECIFICATIONS ($T_A$ = 25°C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **CONDITIONS** | **SYMBOL** | **MIN** | **TYP** | **MAX** | **UNIT** |
| **Static** (Note 3) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250μA | $BV_{DSS}$ | 60 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | $V_{GS(TH)}$ | 0.8 | 1.5 | 2.5 | V |
| Gate Body Leakage | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | $I_{GSS}$ | -- | -- | ±10 | μA |
| Zero Gate Voltage Drain Current | $V_{DS}$ = 60V, $V_{GS}$ = 0V | $I_{DSS}$ | -- | -- | 1 | μA |
| | $V_{DS}$ = 60V, $V_{GS}$ = 0V, $T_J$ =125°C | | -- | -- | 100 | |
| Drain-Source On-State Resistance | $V_{GS}$ = 10V, $I_D$ = 330mA | $R_{DS(on)}$ | -- | 1.2 | 1.6 | Ω |
| | $V_{GS}$ = 4.5V, $I_D$ = 310mA | | -- | 1.5 | 2 | |
| Forward Transconductance | $V_{DS}$ = 10V, $I_D$ = 330mA | $g_{fs}$ | -- | 486 | -- | mS |
| **Dynamic** (Note 4) | | | | | | |
| Total Gate Charge | $V_{DS}$ = 30V, $I_D$ = 330mA, $V_{GS}$ = 10V | $Q_g$ | -- | 1.7 | -- | nC |
| Total Gate Charge | $V_{DS}$ = 30V, $I_D$ = 310mA, $V_{GS}$ = 4.5V | $Q_g$ | -- | 0.9 | -- | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 0.3 | -- | |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 0.3 | -- | |
| Input Capacitance | $V_{DS}$ = 30V, $V_{GS}$ = 0V, f = 1.0MHz | $C_{iss}$ | -- | 27.5 | -- | pF |
| Output Capacitance | | $C_{oss}$ | -- | 8.1 | -- | |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 4.2 | -- | |
| **Switching** (Note 5) | | | | | | |
| Turn-On Delay Time | $V_{DD}$ = 30V, $R_G$ = 6.0Ω, $I_D$ = 330mA, $V_{GS}$ = 10V | $t_{d(on)}$ | -- | 2.9 | -- | ns |
| Turn-On Rise Time | | $t_r$ | -- | 1.7 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 7.2 | -- | |
| Turn-Off Fall Time | | $t_f$ | -- | 5.0 | -- | |
| **Source-Drain Diode** | | | | | | |
| Forward Voltage (Note 3) | $I_S$ = 330mA, $V_{GS}$ = 0V | $V_{SD}$ | -- | 0.9 | 1.2 | V |

**Notes:**

3. Pulse test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.
4. Defined by design. Not subject to production test.
5. Switching time is essentially independent of operating temperature.

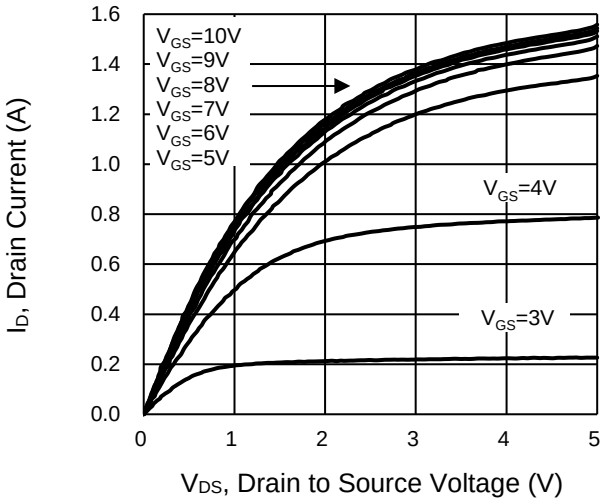
## ORDERING INFORMATION

| ORDERING CODE | PACKAGE | PACKING |
|---|---|---|
| TQM2N7002KDCU6 RFG | SOT-363 | 3,000pcs / 7” Reel |

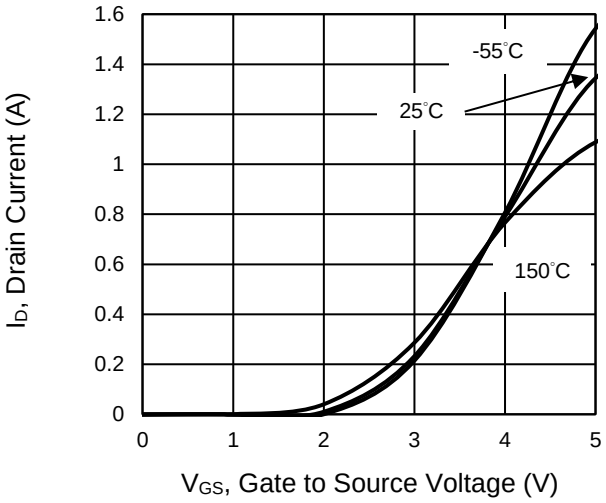
## CHARACTERISTICS CURVES

($T_A$ = 25°C unless otherwise noted)

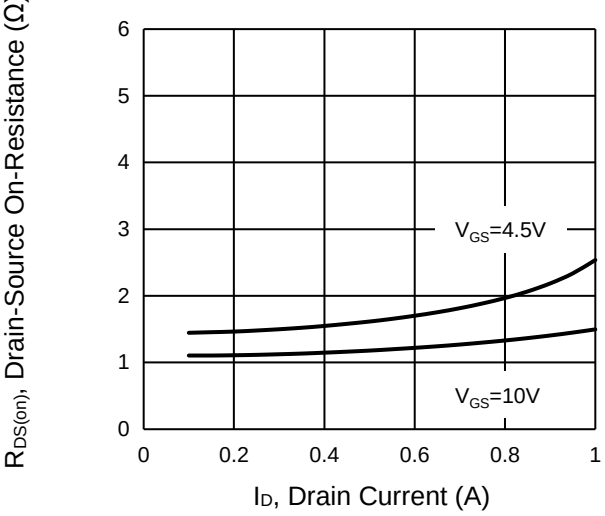
**Output Characteristic**



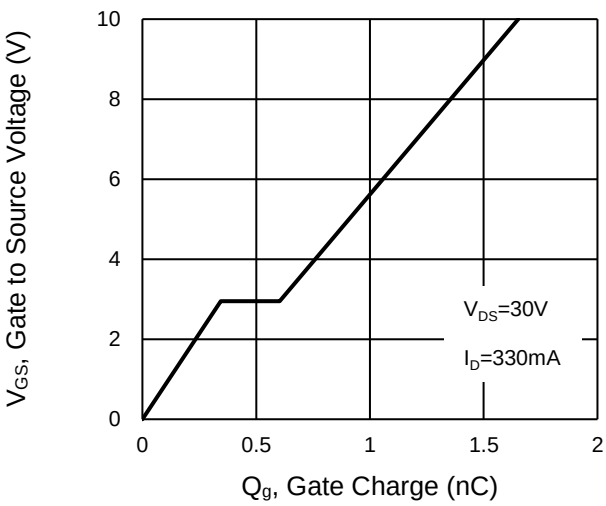

**Transfer Characteristics**



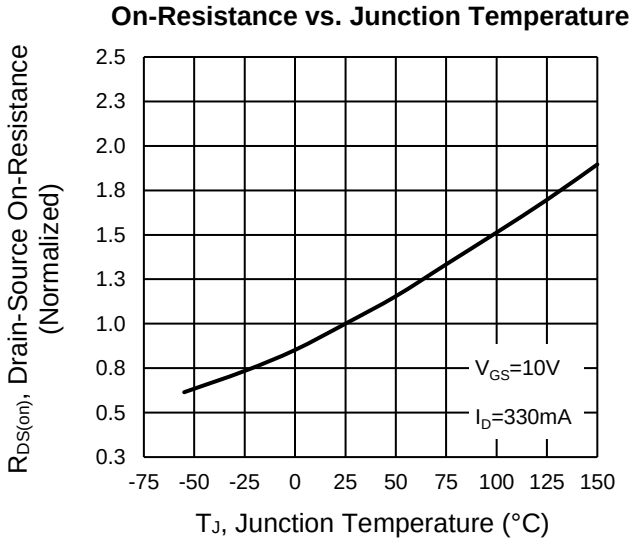

**On-Resistance vs. Drain Current**



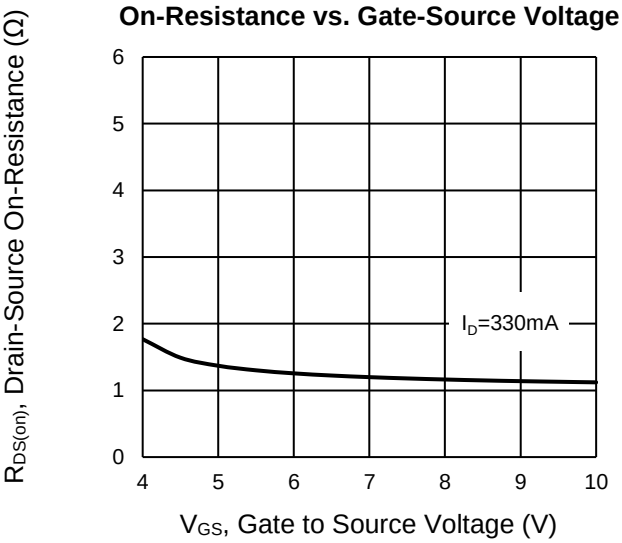

**Gate-Source Voltage vs. Gate Charge**




**On-Resistance vs. Junction Temperature**



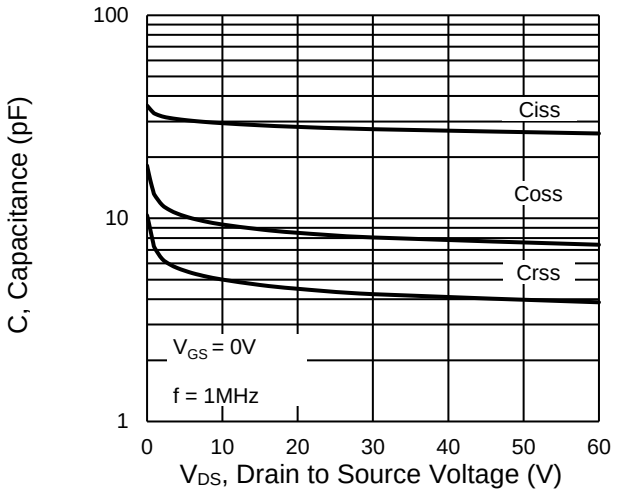

**On-Resistance vs. Gate-Source Voltage**



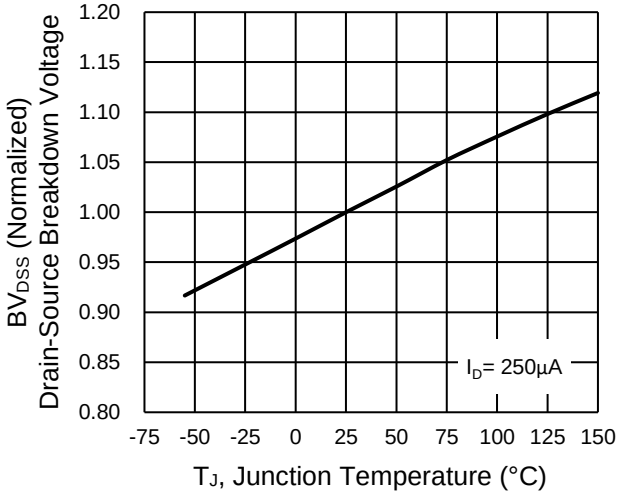
## CHARACTERISTICS CURVES

($T_A$ = 25°C unless otherwise noted)

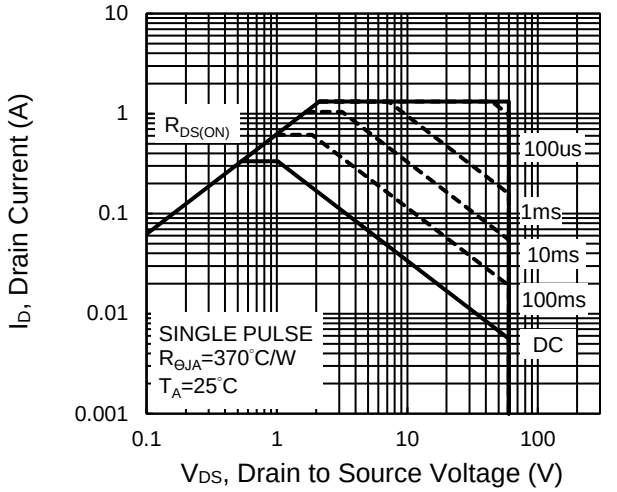
**Capacitance vs. Drain-Source Voltage**



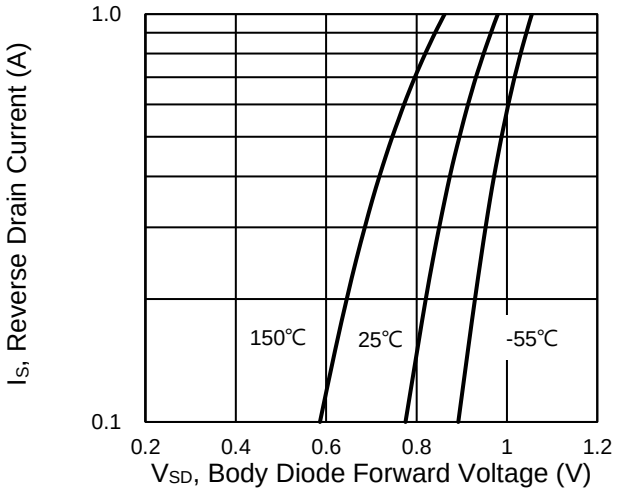

**$BV_{DSS}$ vs. Junction Temperature**



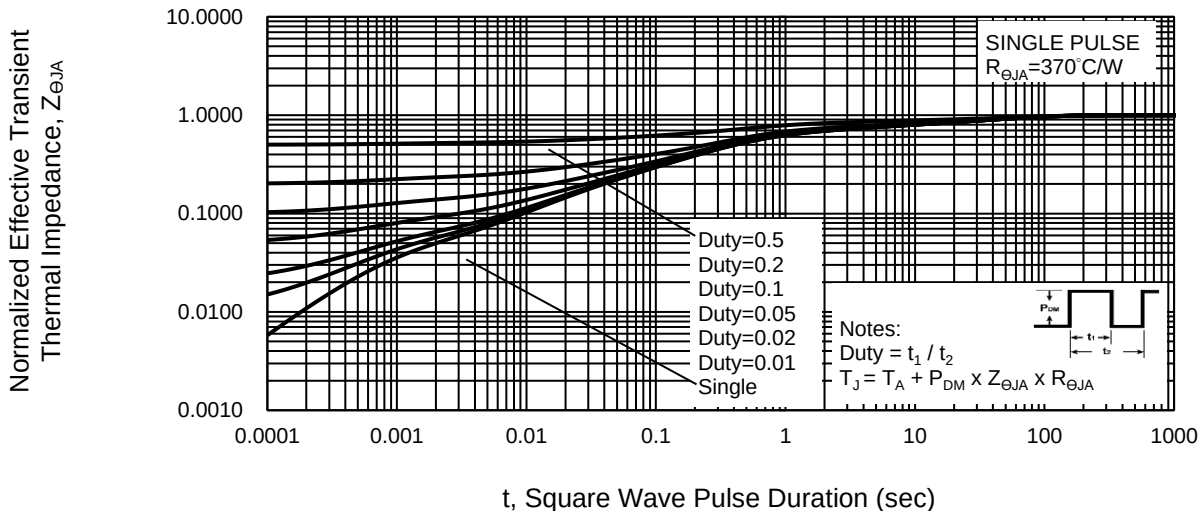

**Maximum Safe Operating Area, Junction-to-Ambient**




**Source-Drain Diode Forward Current vs. Voltage**



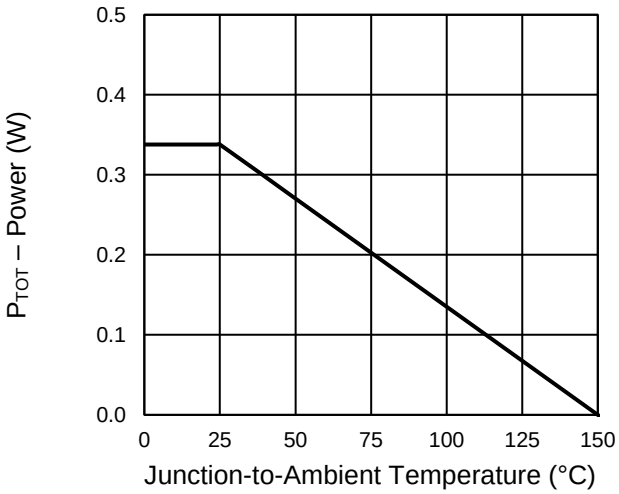

**Normalized Thermal Transient Impedance, Junction-to-Ambient**



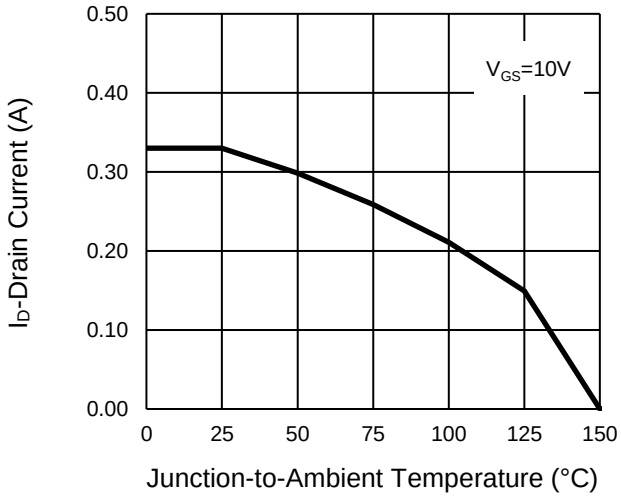
## CHARACTERISTICS CURVES

($T_A$ = 25°C unless otherwise noted)

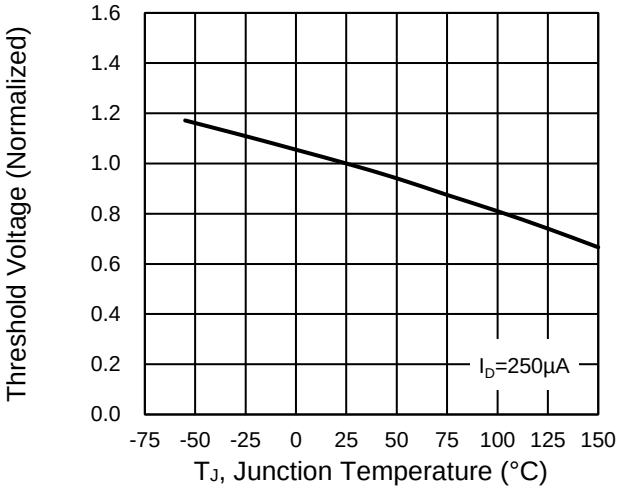
**Power Dissipation**




**Drain Current**

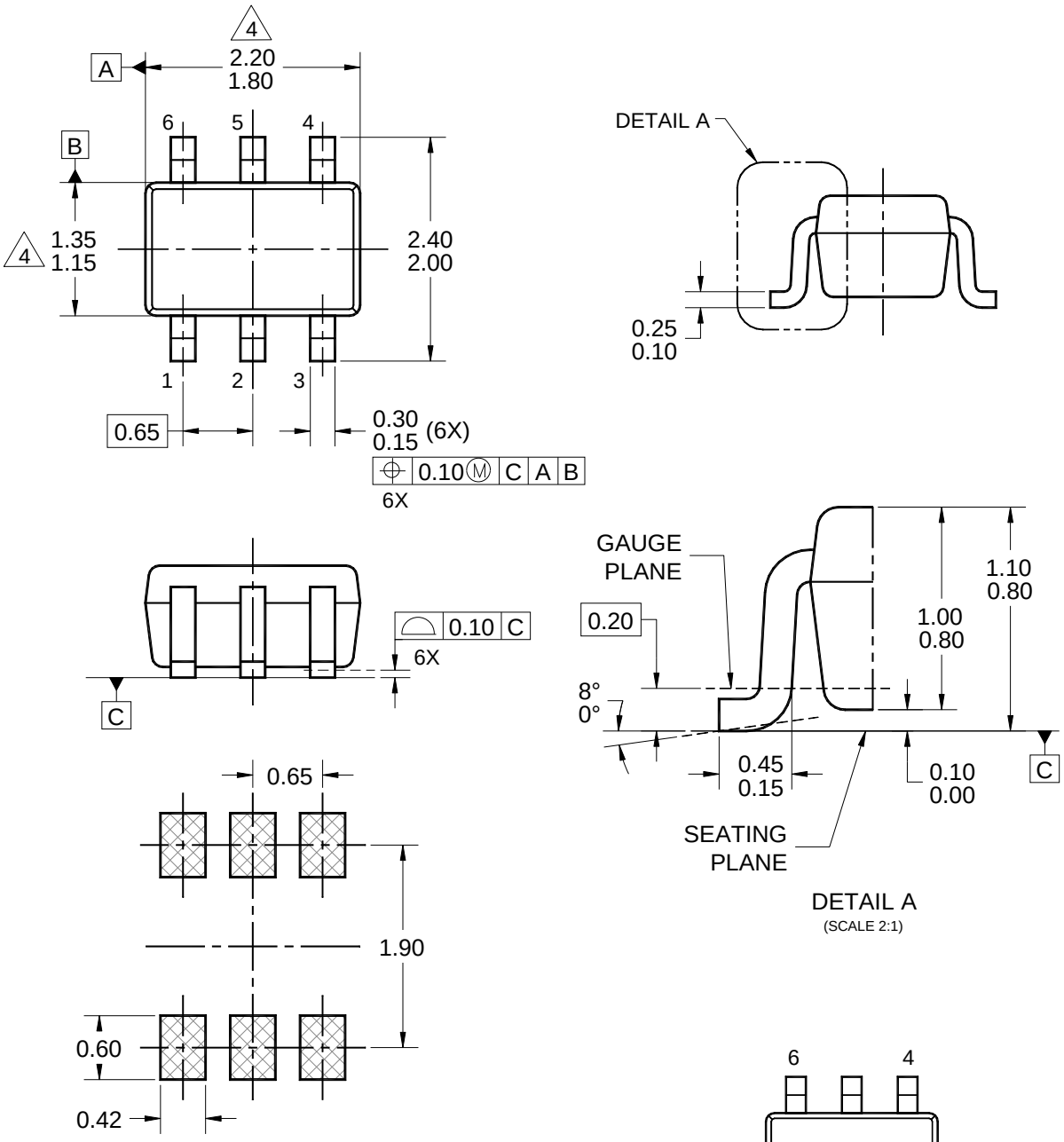



**Normalized gate threshold voltage vs Temperature**

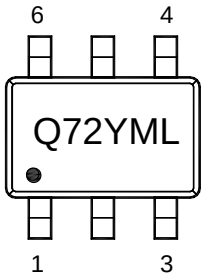


## PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

**SOT-363**




SUGGESTED PAD LAYOUT




MARKING DIAGRAM

Y = Year Code

M = Month Code for Halogen Free Product
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)

L = Lot Code (1~9,A~Z)

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEITA ED-7500A, EIAJ SC-88.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-SOT363-097 REV A.

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