

N-Channel Power MOSFET

650V, 10A, 0.8Ω

FEATURES

- 100% UIS and R_g tested
- Advanced planar process
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

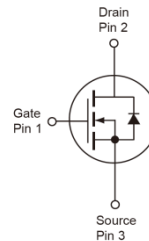
APPLICATIONS

- AC/DC LED Lighting
- Power Supply

| KEY PERFORMANCE PARAMETERS | | |
|----------------------------|-------|------|
| PARAMETER | VALUE | UNIT |
| V _{DS} | 650 | V |
| R _{DS(on)} (max) | 0.8 | Ω |
| Q _g | 39.6 | nC |



ITO-220



| ABSOLUTE MAXIMUM RATINGS (T _A = 25°C unless otherwise noted) | | | |
|---|-----------------------------------|------------------------|------|
| PARAMETER | SYMBOL | Limit | UNIT |
| Drain-Source Voltage | V _{DS} | 650 | V |
| Gate-Source Voltage | V _{GS} | ±30 | V |
| Continuous Drain Current ^(Note 1) | I _D | T _C = 25°C | 10 |
| | | T _C = 100°C | 6.3 |
| Pulsed Drain Current ^(Note 2) | I _{DM} | 40 | A |
| Total Power Dissipation @ T _C = 25°C | P _{DTOT} | 56.8 | W |
| Single Pulse Avalanche Energy ^(Note 3) | E _{AS} | 435 | mJ |
| Single Pulse Avalanche Current ^(Note 3) | I _{AS} | 6.6 | A |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | - 55 to +150 | °C |

| THERMAL PERFORMANCE | | | |
|--|------------------|-------|------|
| PARAMETER | SYMBOL | Limit | UNIT |
| Junction to Case Thermal Resistance | R _{θJC} | 2.2 | °C/W |
| Junction to Ambient Thermal Resistance | R _{θJA} | 62 | °C/W |

Thermal Performance Note: R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. R_{θJA} is guaranteed by design while R_{θCA} is determined by the user's board design.

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|---|---------------|------------|------------|------------|-------------|
| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 650 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 2.5 | 3 | 3.8 | V |
| Gate Body Leakage | $V_{GS} = \pm 30V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 650V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 1 | μA |
| Drain-Source On-State Resistance (Note 4) | $V_{GS} = 10V, I_D = 2.5A$ | $R_{DS(on)}$ | -- | 0.59 | 0.8 | Ω |
| Dynamic (Note 5) | | | | | | |
| Total Gate Charge | $V_{DS} = 520V, I_D = 5A,$ $V_{GS} = 10V$ | Q_g | -- | 39.6 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 8.1 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 12.5 | -- | |
| Input Capacitance | $V_{DS} = 50V, V_{GS} = 0V,$ $f = 1.0MHz$ | C_{iss} | -- | 1863 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 108 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 9 | -- | |
| Gate Resistance | | R_g | -- | 1.3 | 2.6 | Ω |
| Switching (Note 6) | | | | | | |
| Turn-On Delay Time | $V_{DD} = 325V, R_G = 5\Omega,$ $I_D = 5A, V_{GS} = 10V$ | $t_{d(on)}$ | -- | 11 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 20 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 36 | -- | |
| Turn-Off Fall Time | | t_f | -- | 23 | -- | |
| Source-Drain Diode | | | | | | |
| Body-Diode Continuous Forward Current | | I_S | -- | -- | 10 | A |
| Body-Diode Pulsed Current | | I_{SM} | -- | -- | 40 | A |
| Forward Voltage (Note 4) | $I_S = 5A, V_{GS} = 0V$ | V_{SD} | -- | -- | 1.2 | V |
| Reverse Recovery Time | $I_S = 5A$ | t_{rr} | -- | 253 | -- | ns |
| Reverse Recovery Charge | $dI_F/dt = 100A/\mu s$ | Q_{rr} | -- | 2.5 | -- | μC |

Notes:

- Current limited by package
- Pulse width limited by the maximum junction temperature
- $L = 20mH, I_{AS} = 6.6A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu s, \text{duty cycle} \leq 2\%$
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

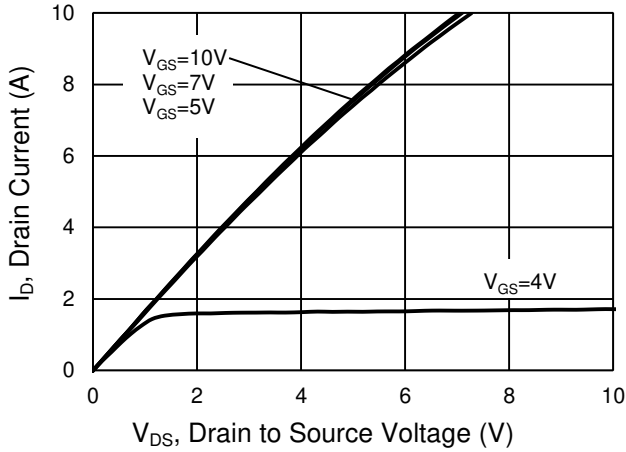
ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|-----------------|----------------|----------------|
| TSM10ND65CI C0G | ITO-220 | 50pcs / Tube |

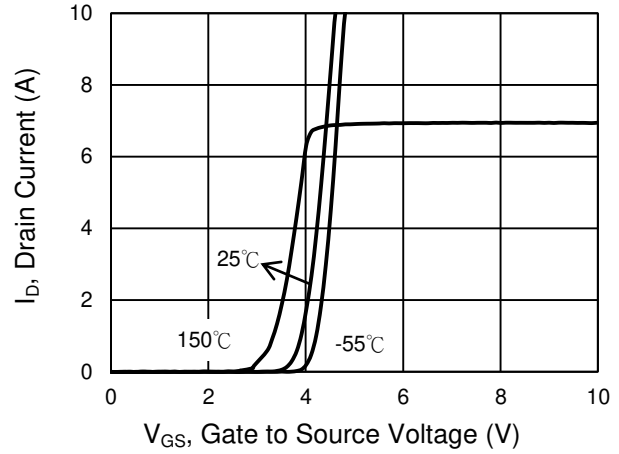
CHARACTERISTICS CURVES

($T_C = 25^\circ\text{C}$ unless otherwise noted)

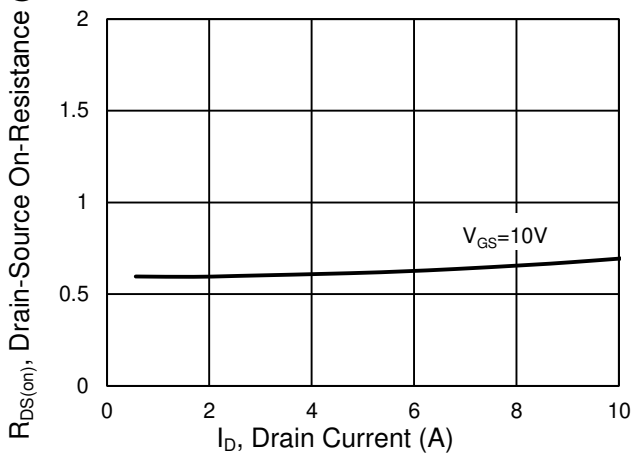
Output Characteristics



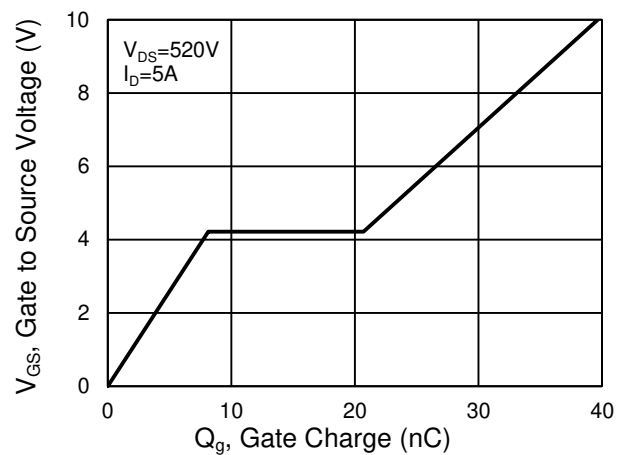
Transfer Characteristics



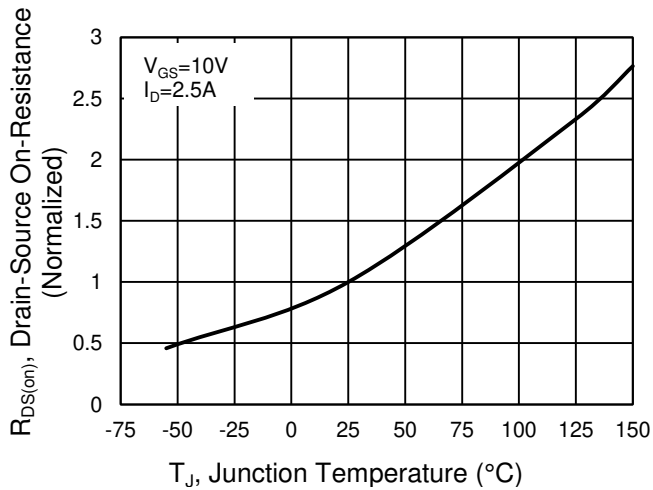
On-Resistance vs. Drain Current



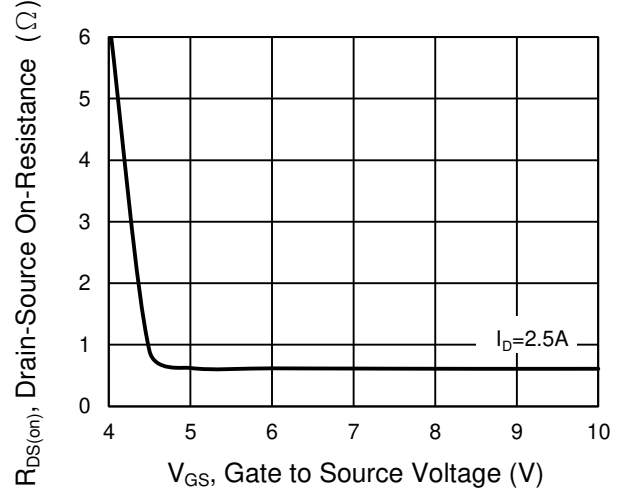
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



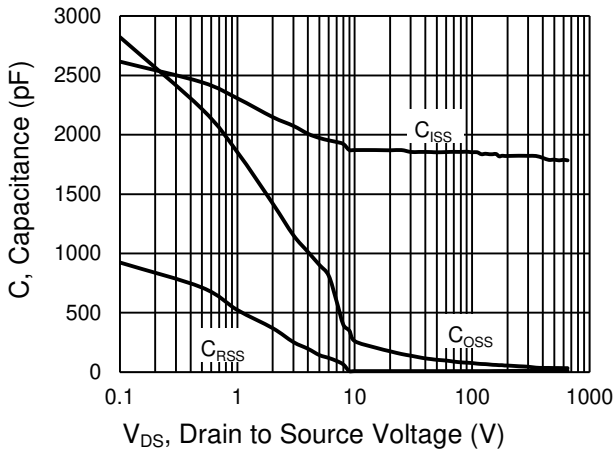
On-Resistance vs. Gate-Source Voltage



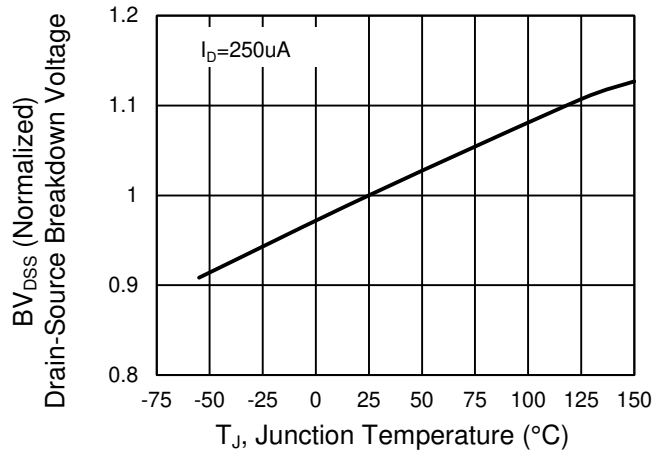
CHARACTERISTICS CURVES

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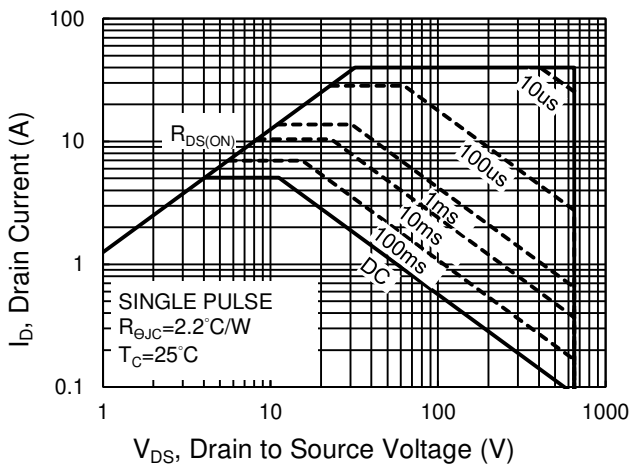
Capacitance vs. Drain-Source Voltage



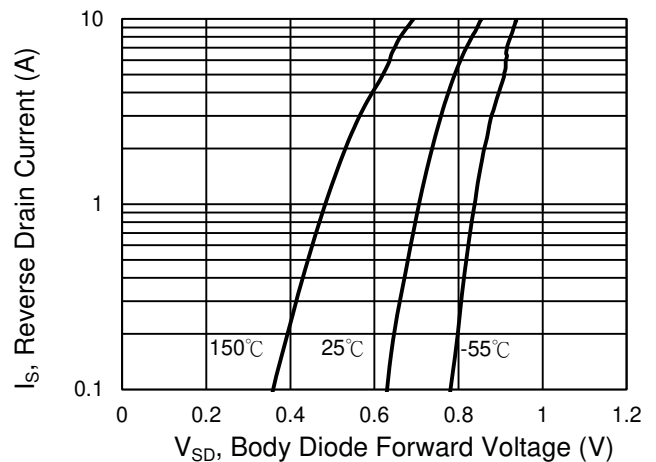
BV_{DSS} vs. Junction Temperature



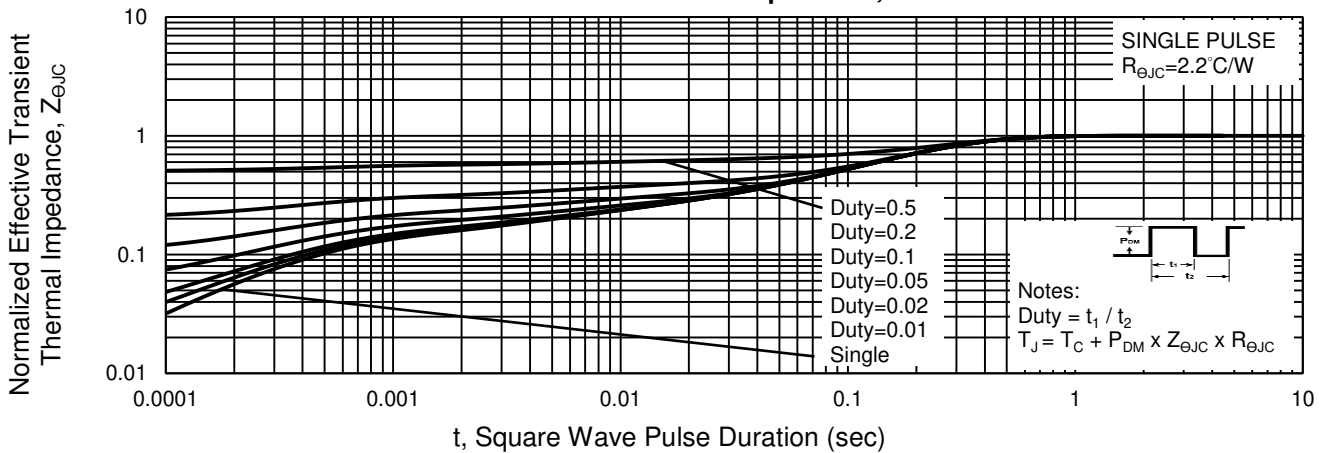
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

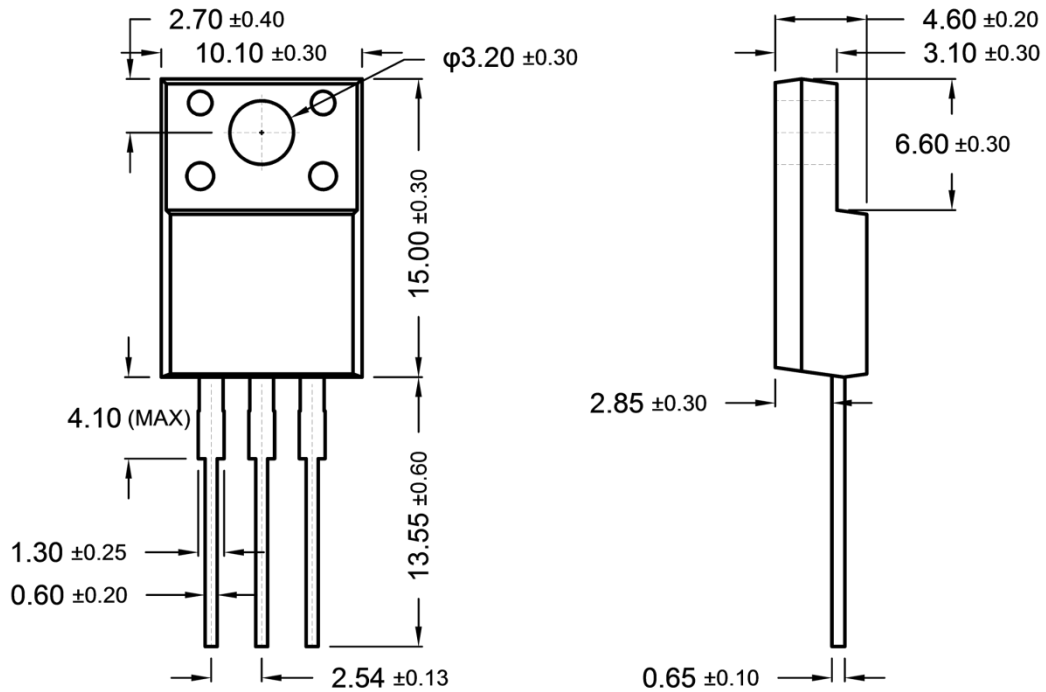


Normalized Thermal Transient Impedance, Junction-to-Case

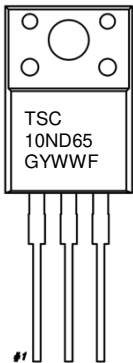


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

ITO-220



MARKING DIAGRAM



- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

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