



**THE DATASHEET OF
TSM85N10CZ C0G**



N-Channel Power MOSFET

100V, 81A, 10mΩ

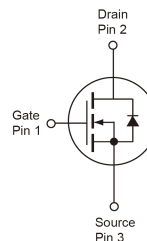
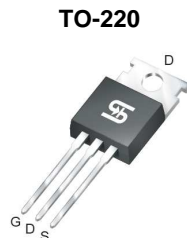
FEATURES

- Advanced Trench Technology
- 100% avalanche tested

APPLICATION

- Synchronous Rectification in SMPS
- High Speed Power Switching

| KEY PERFORMANCE PARAMETERS | | |
|----------------------------|-------|------|
| PARAMETER | VALUE | UNIT |
| V_{DS} | 100 | V |
| $R_{DS(on)}$ (max) | 10 | mΩ |
| Q_g | 154 | nC |



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| PARAMETER | SYMBOL | Limit | UNIT |
|---|------------------|--------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 25 | V |
| Continuous Drain Current ^(Note 1) | I_D | $T_C = 25^\circ\text{C}$ | 81 |
| | | $T_C = 70^\circ\text{C}$ | 65 |
| | | $T_A = 25^\circ\text{C}$ | 8.7 |
| | | $T_A = 70^\circ\text{C}$ | 7 |
| Pulsed Drain Current ^(Note 2) | I_{DM} | 320 | A |
| Total Power Dissipation | P_{DTOT} | $T_C = 25^\circ\text{C}$ | 210 |
| | | $T_C = 70^\circ\text{C}$ | 130 |
| | | $T_A = 25^\circ\text{C}$ | 2.4 |
| | | $T_A = 70^\circ\text{C}$ | 1.5 |
| Single Pulsed Avalanche Energy ^(Note 3) | E_{AS}, E_{AR} | 620 | mJ |
| Single Pulsed Avalanche Current ^(Note 3) | I_{AS}, I_{AR} | 64 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | - 55 to +150 | $^\circ\text{C}$ |

THERMAL PERFORMANCE

| PARAMETER | SYMBOL | Limit | UNIT |
|--|-----------------|-------|--------------------|
| Junction to Case Thermal Resistance | $R_{\theta JC}$ | 0.6 | $^\circ\text{C/W}$ |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 52.5 | $^\circ\text{C/W}$ |

Notes: $R_{\theta JA}$ 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. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 PCB in still air.

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|---|--------------|-----|------|-----------|------------|
| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
| Static (Note 4) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 100 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 2 | 3 | 4 | V |
| Gate Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 80V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 1 | μA |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 40A$ | $R_{DS(ON)}$ | -- | 9 | 10 | m Ω |
| Dynamic (Note 5) | | | | | | |
| Total Gate Charge | $V_{DS} = 30V, I_D = 40A,$ $V_{GS} = 10V$ | Q_g | -- | 154 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 4 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 45 | -- | |
| Input Capacitance | $V_{DS} = 30V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$ | C_{iss} | -- | 3900 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 300 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 170 | -- | |
| Gate Resistance | $F = 1\text{MHz}, \text{open drain}$ | R_g | -- | 1.2 | -- | Ω |
| Switching (Note 6) | | | | | | |
| Turn-On Delay Time | $V_{DS} = 30V,$ $R_{GEN} = 6\Omega,$ $I_D = 1A, V_{GS} = 10V$ | $t_{d(on)}$ | -- | 38 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 65 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 218 | -- | |
| Turn-Off Fall Time | | t_f | -- | 72 | -- | |
| Source-Drain Diode (Note 4) | | | | | | |
| Forward Voltage | $I_S = 20A, V_{GS} = 0V$ | V_{SD} | -- | 0.8 | 1.2 | V |
| Reverse Recovery Time | $I_S = 40A, T_J = 25^\circ\text{C}$ | t_{rr} | -- | 62 | -- | ns |
| Reverse Recovery Charge | $di_f/dt = 100A/\mu s$ | Q_{rr} | -- | 130 | -- | nC |

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. $L = 0.3\text{mH}, I_{AS} = 64A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
4. Pulse test: $PW \leq 300\mu s, \text{duty cycle} \leq 2\%$
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|-----------------|----------------|----------------|
| TSM85N10CZ C0G | TO-220 | 50pcs / Tube |

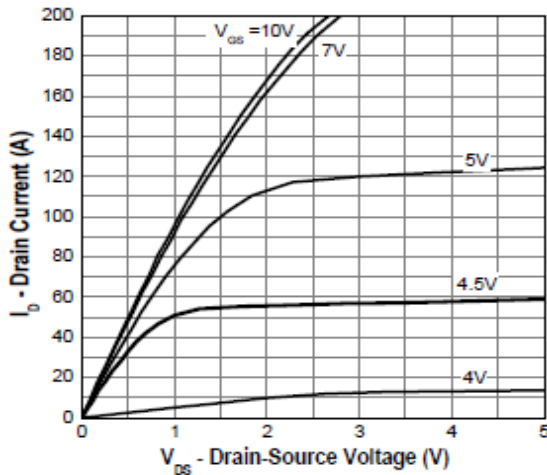
Note:

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

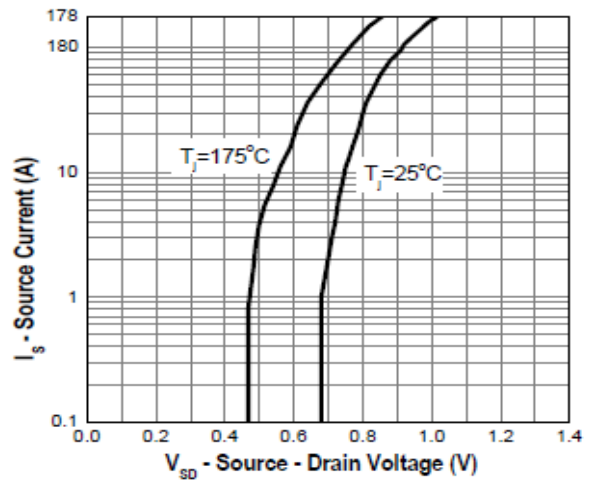
CHARACTERISTICS CURVES

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

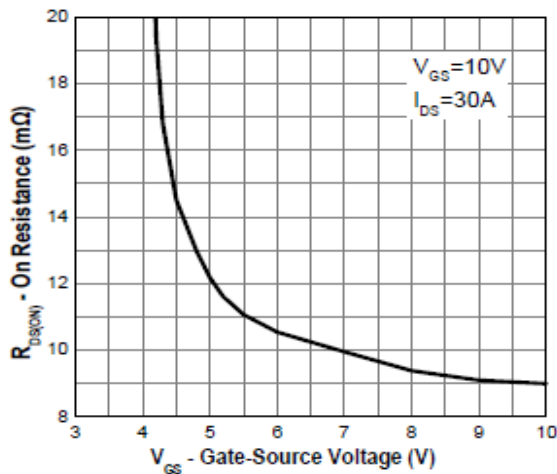
Output Characteristics



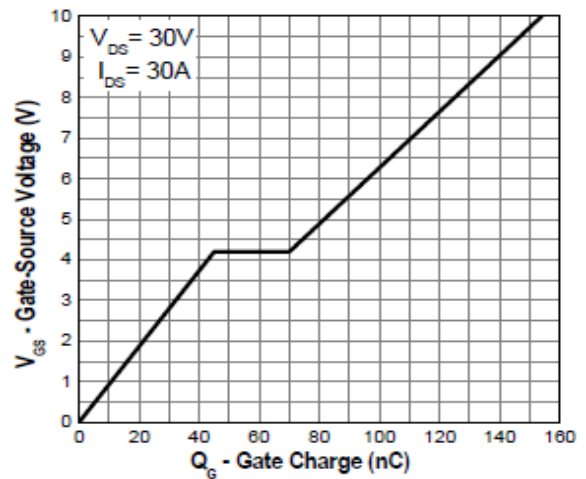
Transfer Characteristics



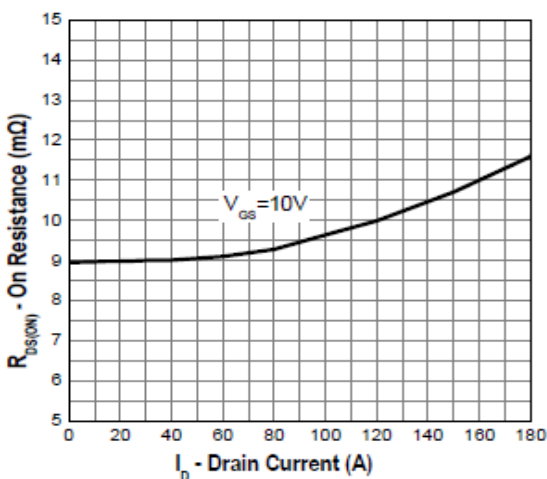
On-Resistance vs. Gate-Source Voltage



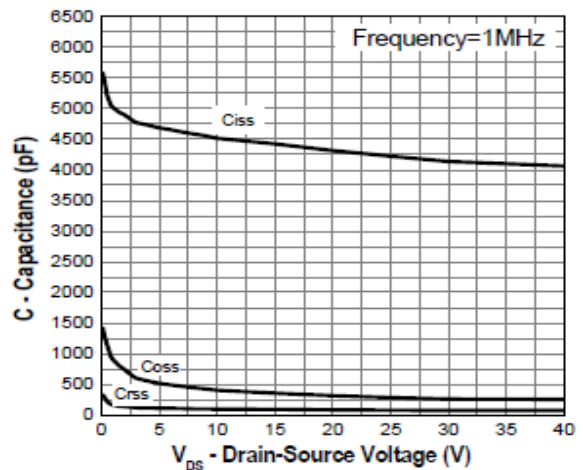
Gate Charge



On-Resistance vs. Junction Temperature



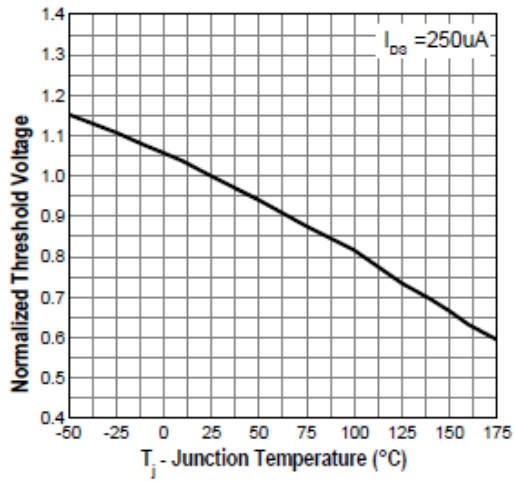
Capacitance



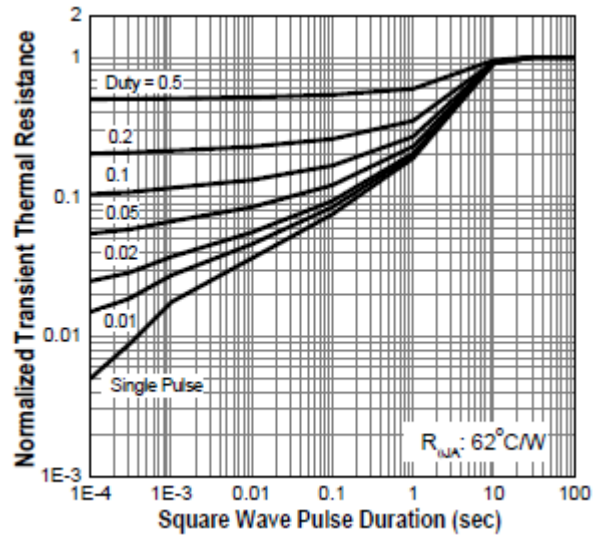
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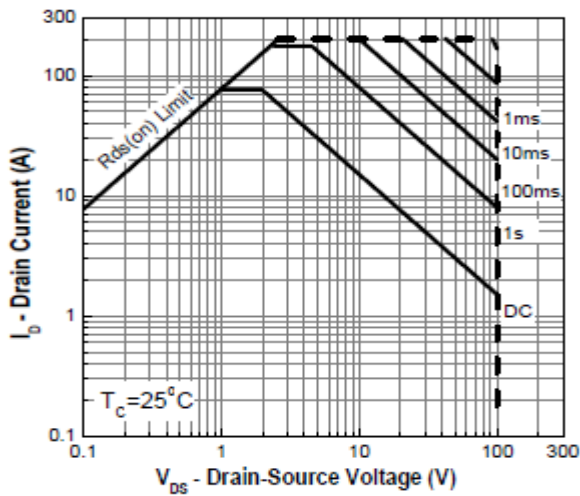
Threshold Voltage vs. Temperature



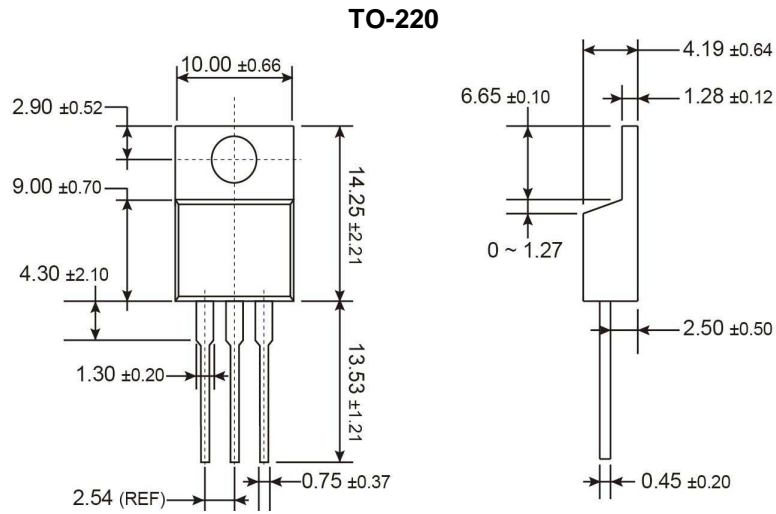
Normalized Thermal Transient Impedance



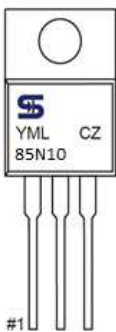
Maximum Safe Operating Area



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



MARKING DIAGRAM



- Y** = Year Code
- M** = Month Code for Halogen Free Product
 - O** =Jan **P** =Feb **Q** =Mar **R** =Apr
 - S** =May **T** =Jun **U** =Jul **V** =Aug
 - W** =Sep **X** =Oct **Y** =Nov **Z** =Dec
- L** = Lot Code (1~9, A~Z)

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