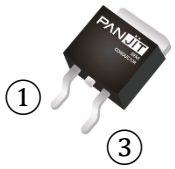
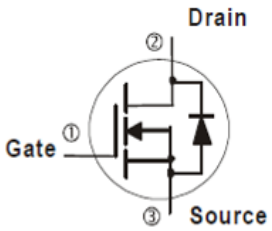
# 650V N-Channel Super Junction MOSFET

| | | | |
|---|---|---|---|
| **Voltage** | **650 V** | **Rdson** | **390 mΩ** |
| **Current** | **10 A** | **Qg** | **19 nC** |

**TO-263**




## Feature:

- $R_{DS(ON)\ Max}$, $V_{GS}$@10V: 390mΩ
- Easy to use/ drive
- High Speed Switching and Low $R_{DS(ON)}$
- 100% Avalanche Tested
- 100% Rg Tested
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

## Mechanical Data

- Case: TO-263 package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0487 ounces, 1.38 grams

## Application

- Monitor Power, TV Power, PD Charger

## Absolute Maximum Ratings ($T_A$ = 25 °C unless otherwise specified)

| PARAMETER | | SYMBOL | LIMIT | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage @ $T_{jmax}$ | | $V_{DS}$ | 700 | V |
| Drain-Source Voltage | | $V_{DS}$ | 650 | |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | |
| Continuous Drain Current | $T_C$=25°C | $I_D$ | 10 | A |
| | $T_C$=100°C | | 6.2 | |
| Pulsed Drain Current | $T_C$=25°C | $I_{DM}$ | 22 | A |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 220 | mJ |
| MOSFET dv/dt ruggedness | | dv/dt | 50 | V/ns |
| Power Dissipation | $T_C$=25°C | $P_D$ | 87.5 | W |
| | $T_C$=100°C | | 35 | |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55~150 | °C |

## Thermal Characteristics

| PARAMETER | | SYMBOL | MAXIMUM | UNITS |
|---|---|---|---|---|
| Thermal Resistance | Junction-to-Case | $R_{\theta JC}$ | 1.43 | °C/W |
| | Junction-to-Ambient (Note 3) | $R_{\theta JA}$ | 62.5 | °C/W |

## Electrical Characteristics ($T_A$ = 25 °C unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 650 | 730 | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 2 | 3.0 | 4 | |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=5.0A (Note 1) | - | 340 | 390 | mΩ |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=650V, $V_{GS}$=0V | - | - | 1 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±30V, $V_{DS}$=0V | - | - | ±100 | nA |
| Transfer characteristics | gfs | $V_{DS}$=20V, $I_D$=11A | - | 10 | - | S |
| **Dynamic** (Note 5) | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=520V, $I_D$=11A, $V_{GS}$=10V | - | 19 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 4 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 8 | - | |
| Input Capacitance | Ciss | $V_{DS}$=400V, $V_{GS}$=0V, f=250kHz | - | 726 | - | pF |
| Output Capacitance | Coss | | - | 29 | - | |
| Reverse Transfer Capacitance | Crss | | - | 8 | - | |
| Effective Output Capacitance Energy Related | $C_{o(er)}$ | $V_{DS}$=0V to 400V, $V_{GS}$=0V, f=250kHz (Note 4) | - | 37 | - | |
| Turn-On Delay Time | $td_{(on)}$ | $V_{DD}$=325V, $I_D$=11A, $V_{GS}$=10V, $R_G$=25Ω (Note 2) | - | 30 | - | ns |
| Turn-On Rise Time | $t_r$ | | - | 50 | - | |
| Turn-Off Delay Time | $td_{(off)}$ | | - | 87 | - | |
| Turn-Off Fall Time | $t_f$ | | - | 42 | - | |
| Gate Resistance | Rg | f=1.0MHz | - | 6.8 | - | Ω |
| **Drain-Source Diode** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | - | - | 10 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=10A, $V_{GS}$=0V | - | 0.89 | 1.5 | V |
| Reverse Recovery Charge | $Q_{rr}$ | $I_S$=11A di/dt=100A/μs | - | 3.3 | - | μC |
| Reverse Recovery Time | $T_{rr}$ | | - | 291 | - | ns |

NOTES :

1. Pulse width≤300us, Duty cycle≤2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance.
4. $C_{o(er)}$ is a capacitance that gives the same stored energy as Coss while $V_{DS}$ is rising from 0V to 80% $V_{(BR)DSS}$
5. Guaranteed by design, not subject to production testing

## TYPICAL CHARACTERISTIC CURVES

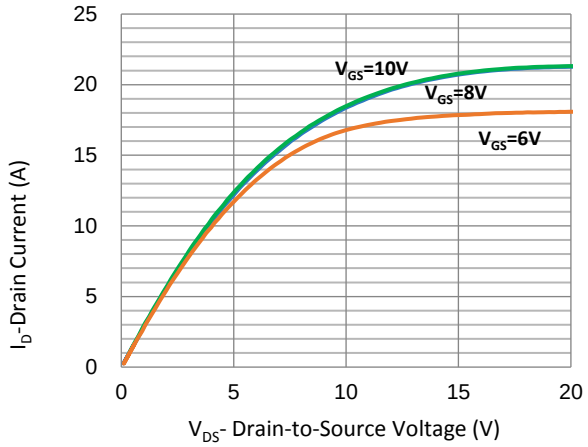



Fig.1 Output Characteristics

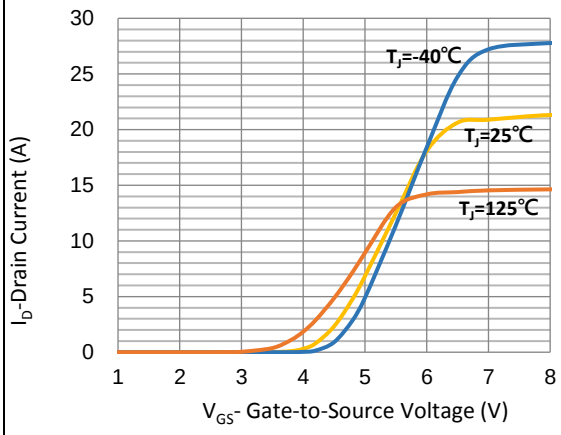



Fig.2 Transfer Characteristics

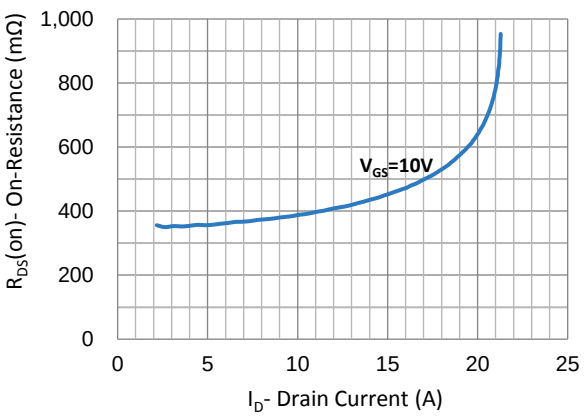



Fig.3 On-Resistance vs. Drain Current

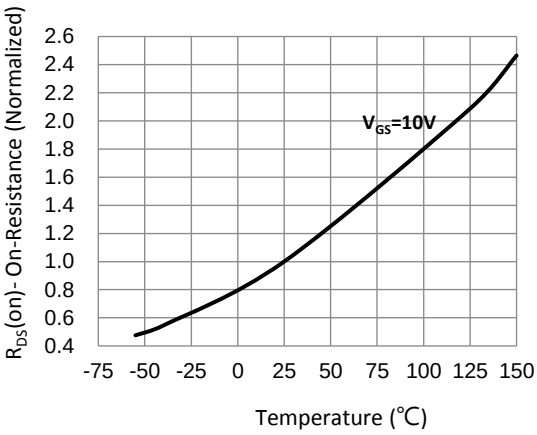



Fig.4 On-Resistance vs. Junction Temperature

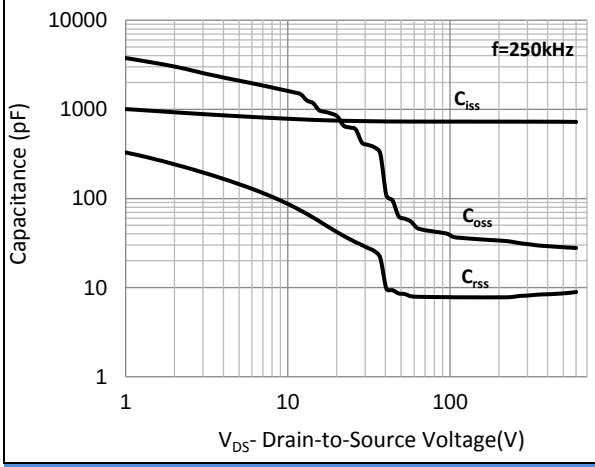



Fig.5 Capacitance vs. Drain-Source Voltage

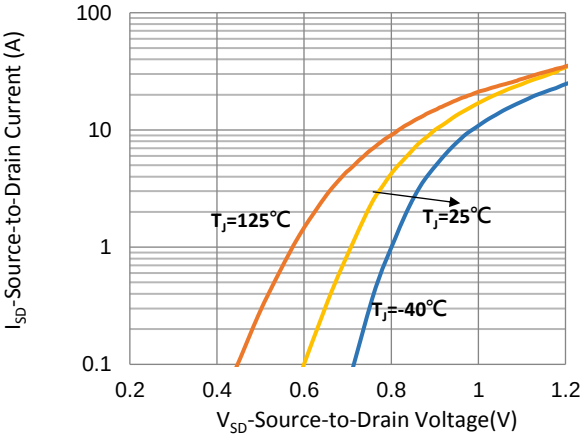



Fig.6 Source-Drain Diode Forward Voltage

## TYPICAL CHARACTERISTIC CURVES

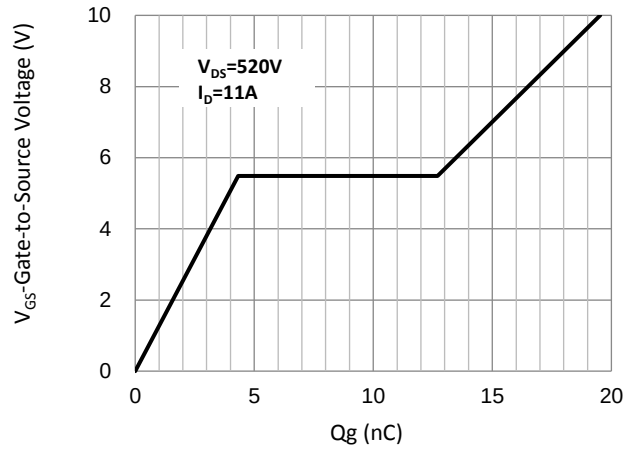



Fig.7 Gate-Charge Characteristics

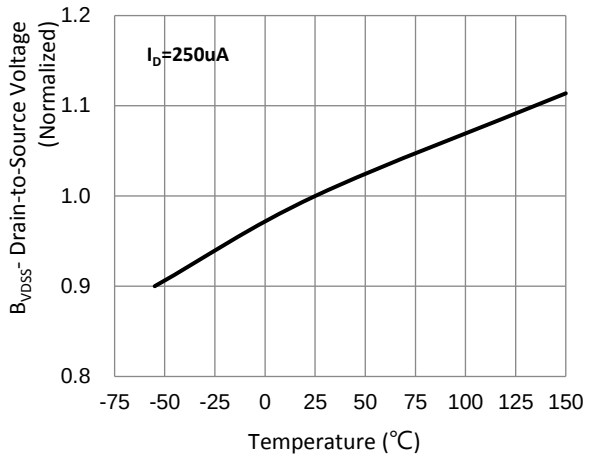



Fig.8 Breakdown Voltage Variation vs. Temperature

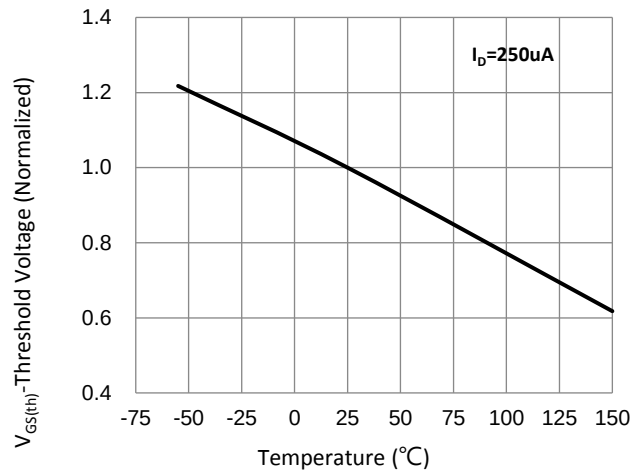



Fig.9 Threshold Voltage Variation with Temperature

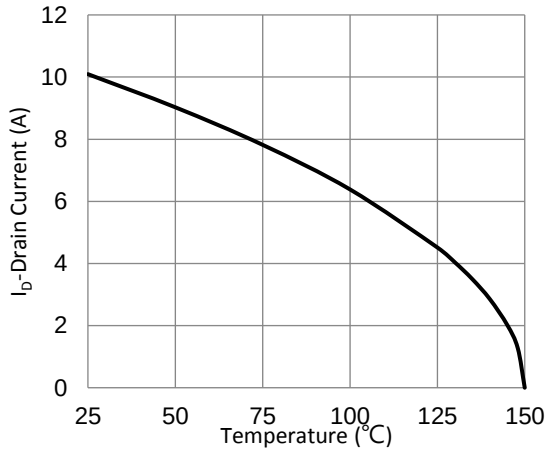



Fig.10 Drain Current vs. Case Temperature

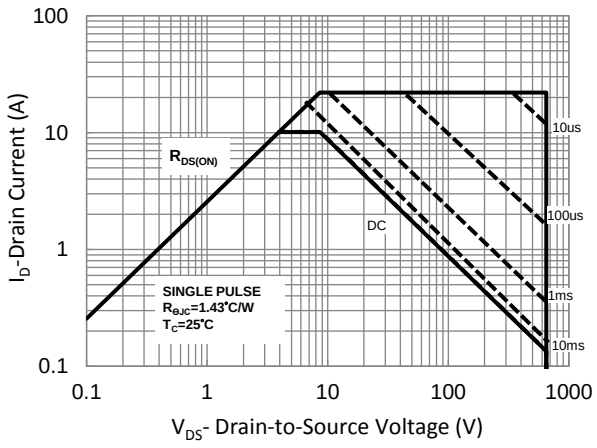



Fig.11 Maximum Safe Operating Area

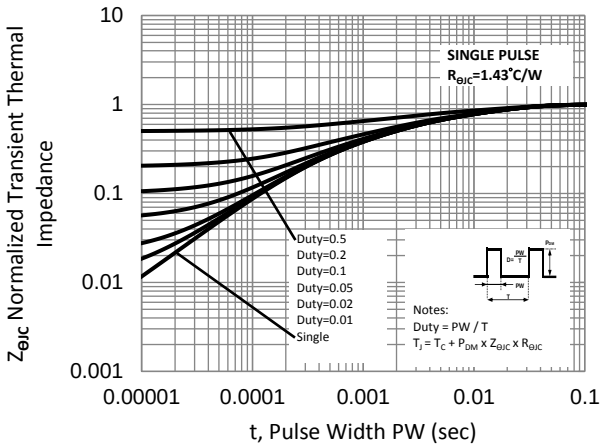



Fig.12 Normalized Transient Thermal Impedance

## TYPICAL CHARACTERISTIC CURVES

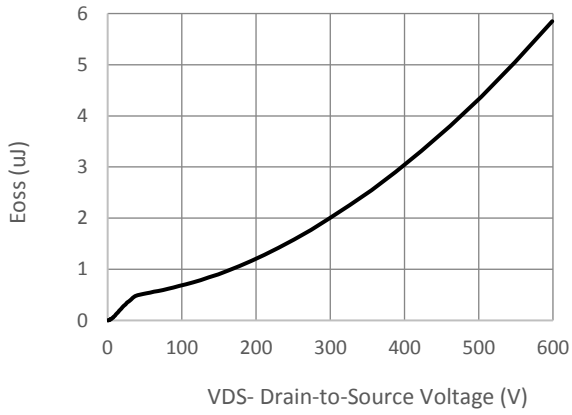


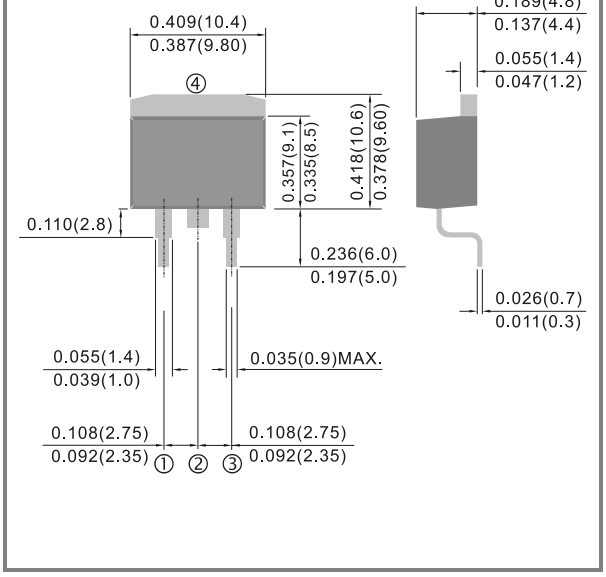

**Fig.13 Typ. Coss Stored Energy**

## Product and Packing Information

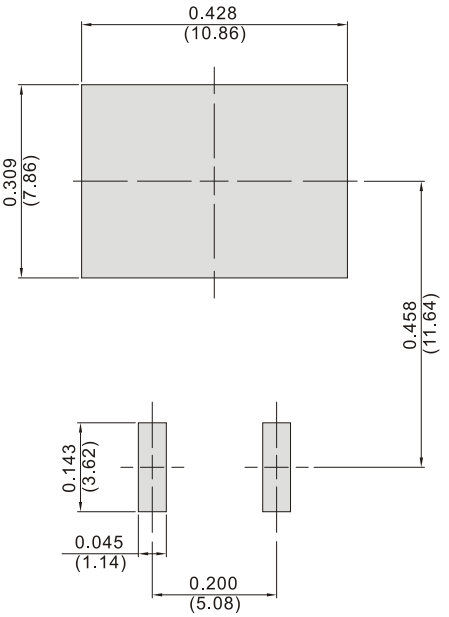
| Part No. | Package Type | Packing Type | Marking |
|---|---|---|---|
| PJMB390N65EC | TO-263 | 50pcs / Tube<br>800pcs / Reel | 390N65EC |

## Packaging Information

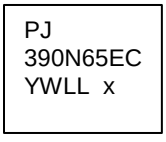
TO-263 Dimension — Unit: inch(mm)




TO-263 Pad Layout — Unit: inch(mm)




## Marking Diagram




**Y** = Year Code
**W** = Week Code (A~Z)
**LL** = Lot Code (00~99)
**x** = Production Line Code

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