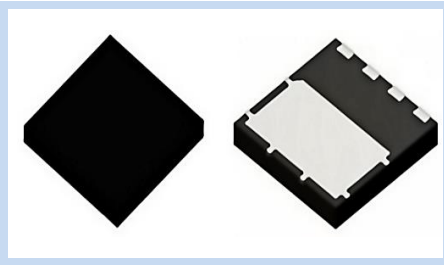
# Silicon Carbide MOSFET
# N-Channel 650V 153A DFN8x8

MFTC65N153D88

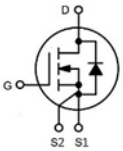
MERITEK

## FEATURE



- $R_{DS(ON)}$<38mΩ at $V_{GS}$=18V, $I_D$=40A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low Reverse Recovery Charge
- Applications: High Voltage DC-DC Converter, Switch Mode Power Supplier, Motor Drives, Renewable Energy

## MECHANICAL DATA




RoHS

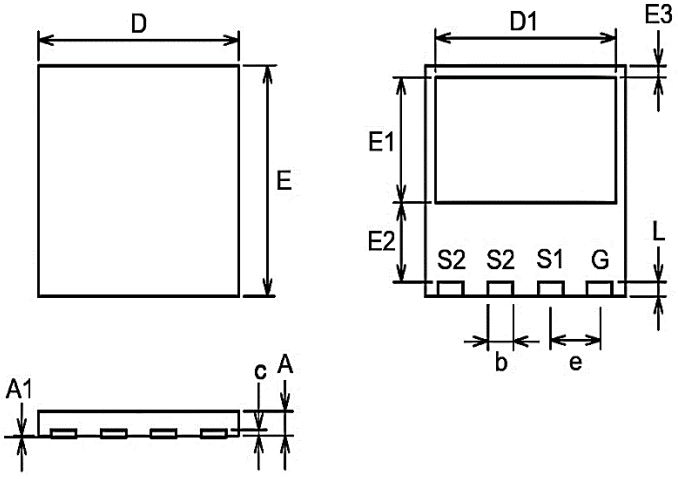
- Case: DFN 8x8 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

## MAXIMUM RATINGS

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{GS}$=0V, $I_D$=100μA | $V_{DS}$ | 650 | V |
| Gate-Source Voltage | Dynamic (f >1Hz) | $V_{GS}$ | -10/+25 | V |
| | Static | | -4/+18 | |
| Continuous Drain Current | $V_{GS}$=18V, $T_C$=25°C | $I_D$ | 153 | A |
| | $V_{GS}$=18V, $T_C$=100°C | | 108 | |
| Drain Current – Pulse with $t_p$ Limited by $T_{jmax}$ | at 1ms | $I_{DM}$ | 196 | A |
| | at 100μs | | 357 | |
| Power Dissipation | $T_C$=25°C | $P_D$ | 714 | W |
| Thermal Resistance, Junction to Case | | $R_{\theta JC}$ | 0.21 | °C / W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 175 | °C |

## DIMENSIONS

| DIMENSION | Min (mm) | Max (mm) |
|---|---|---|
| A | 0.90 | 1.10 |
| A1 | 0.00 | 0.05 |
| b | 0.90 | 1.10 |
| c | 0.10 | 0.30 |
| D | 7.90 | 8.10 |
| D1 | 7.10 | 7.30 |
| e | 2.00 BSC | |
| E | 7.90 | 8.10 |
| E1 | 4.25 | 4.45 |
| E2 | 2.65 | 2.85 |
| E3 | 0.30 | 0.50 |
| L | 0.40 | 0.60 |

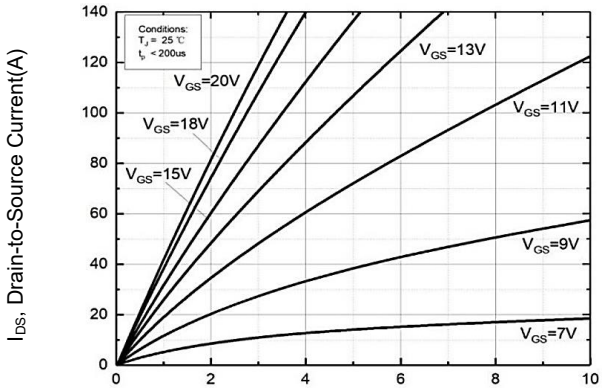


## ELECTRICAL CHARACTERISTICS

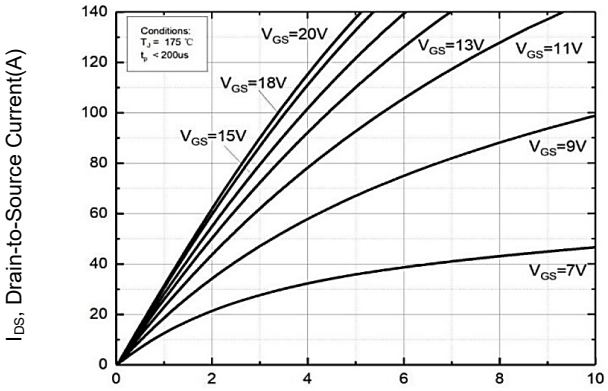
| Off Characteristics | Conditions | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=100μA | $BV_{DSS}$ | 650 | -- | -- | V |
| Zero Gate Voltage Drain Current | $V_{DS}$=650V, $V_{GS}$=0V | $I_{DSS}$ | -- | 1 | 50 | μA |
| Gate-Body Leakage Current | $V_{GS}$=18V, $V_{DS}$=0V | $I_{GSS}$ | -- | -- | 250 | nA |
| **On Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Static Drain-Source On-Resistance | $V_{GS}$=18V, $I_D$=40A | $R_{DS(ON)}$ | -- | 26 | 38 | mΩ |
| | $V_{GS}$=20V, $I_D$=40A | | -- | 23 | -- | |
| | $V_{GS}$=18V, $I_D$=40A, $T_J$=175°C | | -- | 32 | -- | |
| | $V_{GS}$=20V, $I_D$=40A, $T_J$=175°C | | -- | 30 | -- | |
| Gate Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=16mA | $V_{GS(th)}$ | -- | 3 | -- | V |
| | $V_{GS}$=$V_{DS}$, $I_D$=16mA, $T_J$=175°C | | -- | 2 | -- | |
| **Dynamic Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Total Gate Charge | $V_{DS}$=400V, $I_D$=40A, $V_{GS}$= -4/+18V | $Q_g$ | -- | 138 | -- | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 67.3 | -- | |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 26.2 | -- | |
| Input Capacitance | $V_{DS}$=600V, $V_{GS}$=0V, $V_{AC}$=25mV f=1MHz | $C_{iss}$ | -- | 3249 | -- | pF |
| Output Capacitance | | $C_{oss}$ | -- | 193 | -- | |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 14 | -- | |
| **Drain-Source Body Diode** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Drain-Source Diode Forward Voltage | $V_{GS}$= -4V, $I_{SD}$=20A | $V_{SD}$ | -- | 3.9 | -- | V |
| | $V_{GS}$= -4V, $I_{SD}$=20A, $T_J$=175°C | | -- | 3.5 | -- | |
| Diode Forward Current - Continuous | $V_{GS}$= -4V, $T_C$=25°C | $I_S$ | -- | 130 | -- | A |

## CHARACTERISTIC CURVES

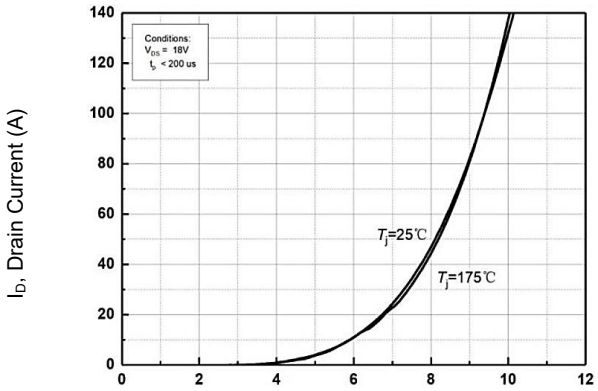
**Output Characteristics**



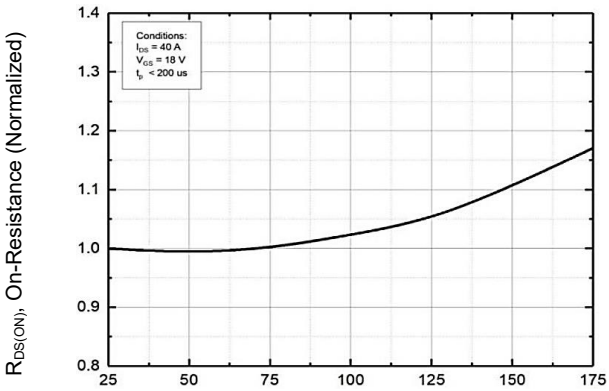

**Output Characteristics**



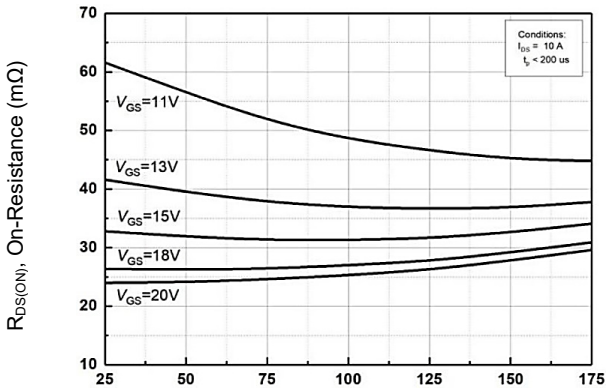

**Transfer Characteristic**



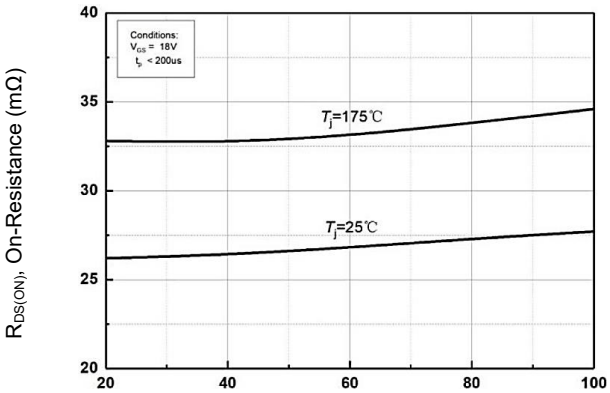

**Normalized On-Resistance vs. Junction temperature**




**On-Resistance vs. Junction temperature for $V_{GS}$**

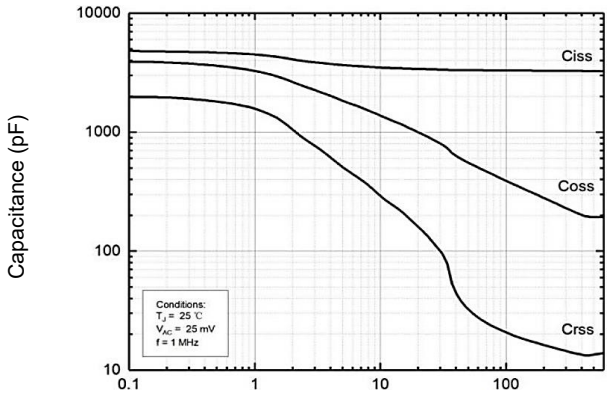



**On-Resistance vs. Drain Current**



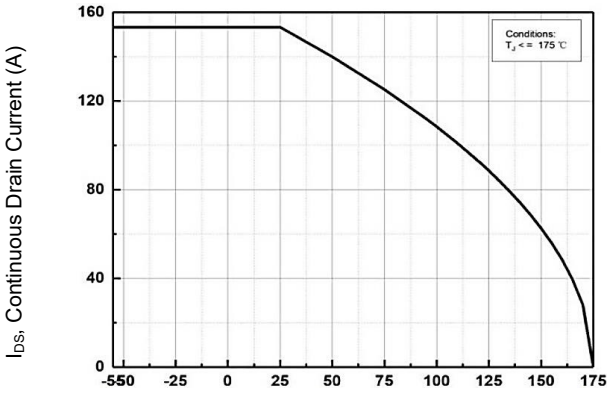
## CHARACTERISTIC CURVES

**Capacitance vs. Drain-Source Voltage**



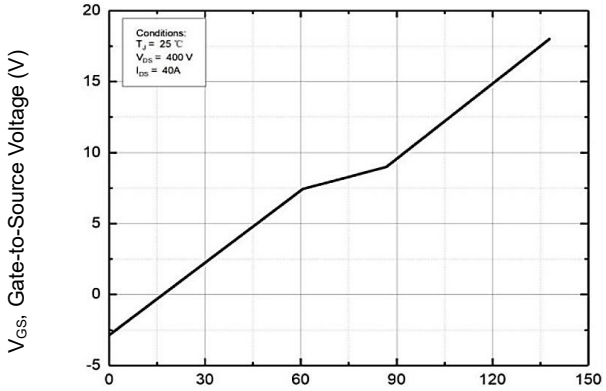

$V_{DS}$, Drain -to- Source Voltage (V)

**Continuous Drain Current vs. Case Temperature**



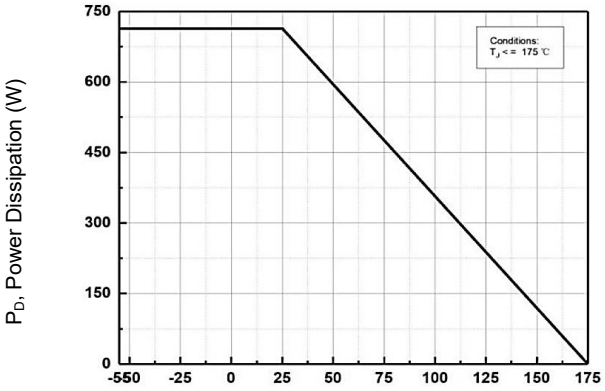

Case Temperature (°C)

**Gate-Charge Characteristics**



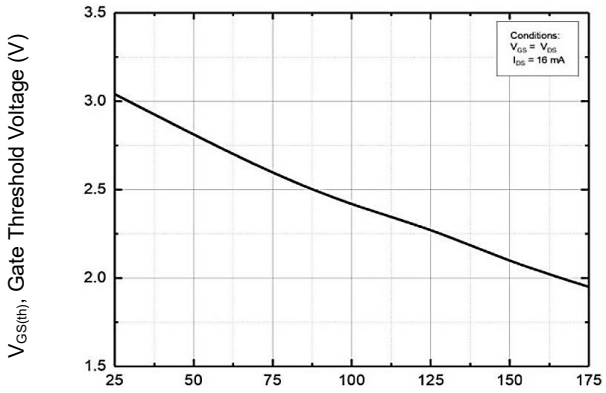

$Q_g$, Gate Charge (nC)

**Maximum Power Dissipation Derating**



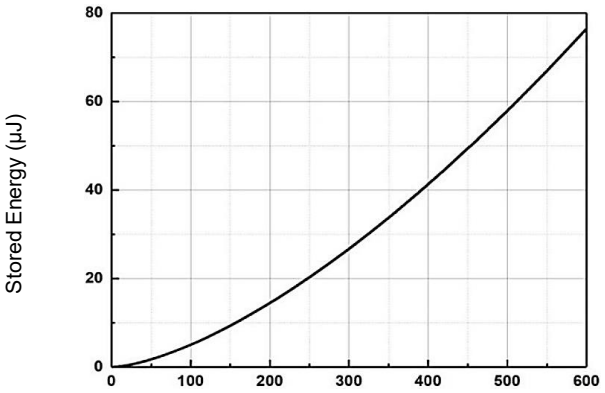

Case Temperature (°C)

**Threshold Voltage vs. Junction temperature**




$V_{DS}$, Drain-to-Source Voltage (V)

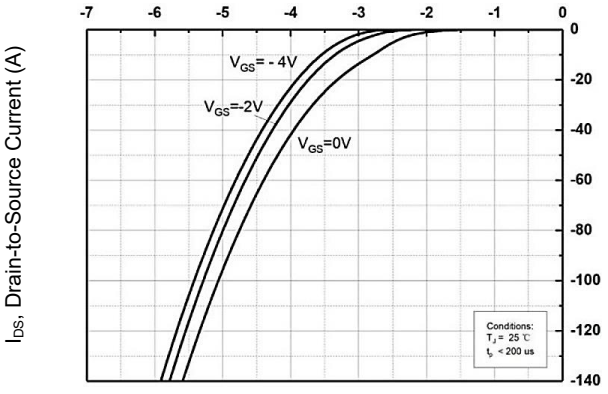
**Output Capacitor Stored Energy**



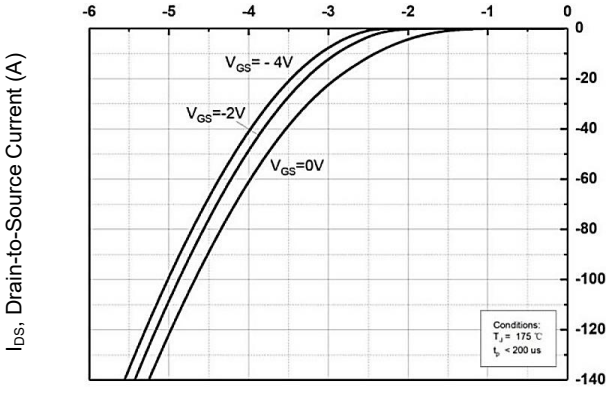

$V_R$, Reverse Voltage (V)

## CHARACTERISTIC CURVES

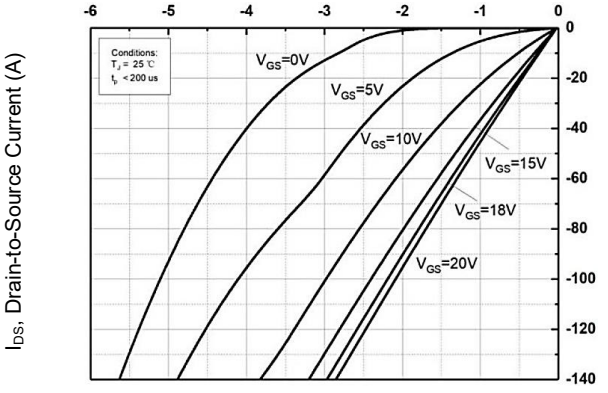
**Body Diode Characteristics**



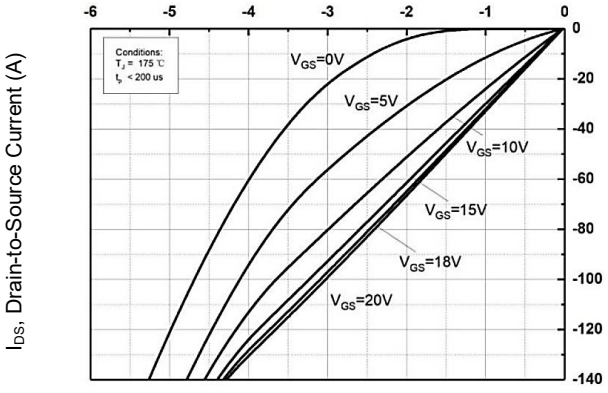

**Body Diode Characteristics**



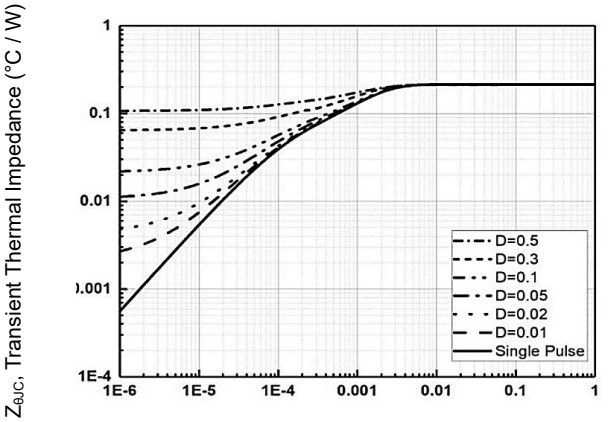

**3rd Quadrant Characteristics**




**3rd Quadrant Characteristics**




**Transient Thermal Impedance**




**Safe Operating Area**