

# Silicon Carbide MOSFET

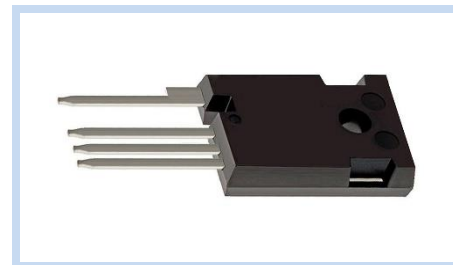
## N-Channel 3300V 68A TO-247-4

MFTC330N68T2474

MERITEK

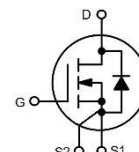
### FEATURE

- $R_{DS(ON)} < 70\text{m}\Omega$  at  $V_{GS}=18\text{V}$ ,  $I_D=50\text{A}$
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery Charge
- Applications: Solar Inverters, Rail Traction, Motor Drive, Ultra-Fast EV Charges



### MECHANICAL DATA

- Case: TO-247-4 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

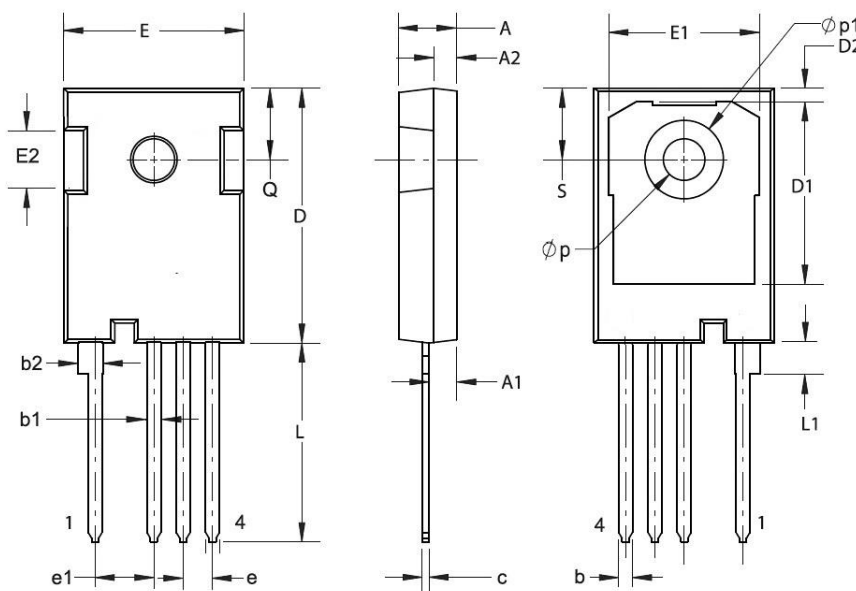


### MAXIMUM RATINGS

| Parameter                                        |                                               | Symbol          | Value      | Unit                        |
|--------------------------------------------------|-----------------------------------------------|-----------------|------------|-----------------------------|
| Drain-Source Voltage                             | $V_{GS}=0\text{V}$ , $I_D=100\mu\text{A}$     | $V_{DS}$        | 3300       | V                           |
| Gate-Source Voltage                              | Absolute Maximum Value                        | $V_{GS}$        | -10/+22    | V                           |
|                                                  | Static                                        |                 | -5/+18     |                             |
| Drain Current – Continuous                       | $V_{GS}=18\text{V}$ , $T_C=25^\circ\text{C}$  | $I_D$           | 68         | A                           |
|                                                  | $V_{GS}=18\text{V}$ , $T_C=100^\circ\text{C}$ |                 | 42         |                             |
| Power Dissipation                                |                                               | $P_D$           | 560        | W                           |
| Thermal Resistance, Junction to Case             |                                               | $R_{\theta JC}$ | 0.22       | $^\circ\text{C} / \text{W}$ |
| Operating Junction and Storage Temperature Range |                                               | $T_J, T_{STG}$  | -55 to 150 | $^\circ\text{C}$            |

### DIMENSIONS

| TO-247-4 | Min (mm) | Max (mm) |
|----------|----------|----------|
| A        | 4.80     | 5.20     |
| A1       | 2.25     | 2.45     |
| A2       | 1.85     | 2.150    |
| b        | 1.05     | 1.35     |
| b1       | 1.0      | 1.6      |
| b2       | 2.35     | 2.95     |
| c        | 0.50     | 0.70     |
| D        | 22.34    | 22.74    |
| D1       | 16.0     | 17.0     |
| D2       | 0.97     | 1.37     |
| e        | 2.34     | 2.74     |
| e1       | 4.88     | 5.28     |
| E        | 15.6     | 16.0     |
| E1       | 13.5     | 14.5     |
| L        | 18.08    | 18.68    |
| L1       | 2.38     | 2.78     |
| p        | 3.50     | 3.70     |
| p1       | 6.6      | 7.0      |
| Q        | 6.0      | 6.3      |
| S        | 6.0      | 6.3      |



Note: 1:Drain(D), 2:Source(S2), 3:Source(S1), 4:Gate(G)

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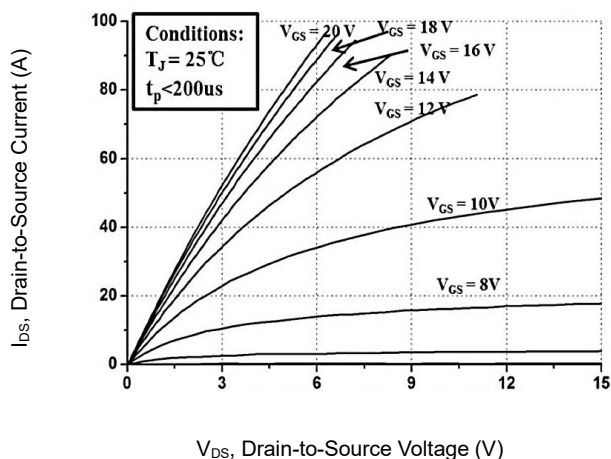
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### ELECTRICAL CHARACTERISTICS

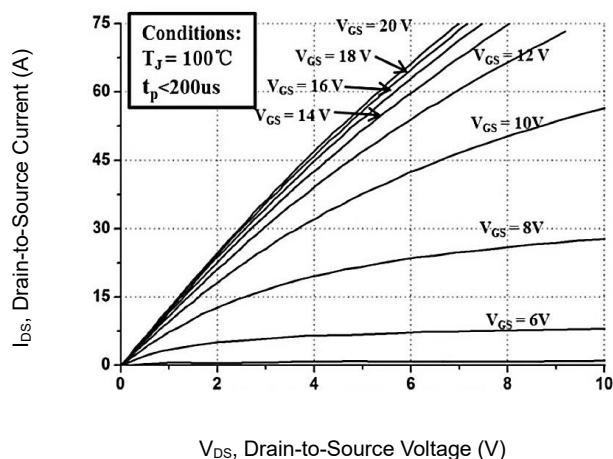
| Off Characteristics                | Conditions                                                                 | Symbol       | Min  | Typ. | Max | Unit       |
|------------------------------------|----------------------------------------------------------------------------|--------------|------|------|-----|------------|
| Drain-Source Breakdown Voltage     | $V_{GS}=0V, I_D=100\mu A$                                                  | $BV_{DSS}$   | 3300 | --   | --  | V          |
| Zero Gate Voltage Drain Current    | $V_{DS}=3300V, V_{GS}=0V$                                                  | $I_{DSS}$    | --   | 1    | 100 | $\mu A$    |
| Gate-Body Leakage Current, Forward | $V_{GS}=22V, V_{DS}=0V$                                                    | $I_{GSSF}$   | --   | 10   | 250 | nA         |
| Gate-Body Leakage Current, Reverse | $V_{GS}=-8V, V_{DS}=0V$                                                    | $I_{GSSR}$   | --   | 10   | 250 | nA         |
| On Characteristics                 | Conditions                                                                 | Symbol       | Min  | Typ. | Max | Unit       |
| Static Drain-Source On-Resistance  | $V_{GS}=18V, I_D=50A$                                                      | $R_{DS(ON)}$ | --   | 50   | 70  | m $\Omega$ |
|                                    | $V_{GS}=18V, I_D=50A, T_J=150^\circ C$                                     |              | --   | 120  | 160 |            |
| Gate Threshold Voltage             | $V_{GS}=V_{DS}, I_D=18mA$                                                  | $V_{GS(th)}$ | 2.0  | 2.6  | 4.0 | V          |
|                                    | $V_{GS}=V_{DS}, I_D=18mA, T_J=150^\circ C$                                 |              | --   | 1.8  | --  |            |
| Dynamic Characteristics            | Conditions                                                                 | Symbol       | Min  | Typ. | Max | Unit       |
| Total Gate Charge                  | $V_{DS}=1700V, I_D=40A, V_{GS}= -4/+18V$                                   | $Q_g$        | --   | 262  | --  | nC         |
| Gate-Source Charge                 |                                                                            | $Q_{gs}$     | --   | 72   | --  |            |
| Gate-Drain Charge                  |                                                                            | $Q_{gd}$     | --   | 54   | --  |            |
| Turn-On Delay Time                 | $V_{DS}=1700V, I_D=35A, R_L=40\Omega, V_{GS}= -5/+20V, R_{GEN}=2.5\Omega,$ | $T_{d(on)}$  | --   | 34   | --  | nS         |
| Rise Time                          |                                                                            | $T_r$        | --   | 47.2 | --  |            |
| Turn-Off Delay Time                |                                                                            | $T_{d(off)}$ | --   | 88   | --  |            |
| Fall Time                          |                                                                            | $T_f$        | --   | 39.2 | --  |            |
| Turn-On Switching Loss             | $V_{DS}=1700V, I_D=35A, L=200\mu H, V_{GS}= -5/+20V, R_{GEN}=2.5\Omega,$   | $E_{ON}$     | --   | 6.18 | --  | mJ         |
| Turn-Off Switching Loss            |                                                                            | $E_{OFF}$    | --   | 3.77 | --  |            |
| Input Capacitance                  | $V_{DS}=1700V, V_{GS}=0V, V_{AC}=25mV, f=1MHz$                             | $C_{iss}$    | --   | 5050 | --  | pF         |
| Output Capacitance                 |                                                                            | $C_{oss}$    | --   | 360  | --  |            |
| Reverse Transfer Capacitance       |                                                                            | $C_{rss}$    | --   | 18   | --  |            |
| Drain-Source Body Diode            | Conditions                                                                 | Symbol       | Min  | Typ. | Max | Unit       |
| Diode Forward Current              | --                                                                         | $I_S$        | --   | --   | 68  | A          |
| Drain-Source Diode Forward Voltage | $V_{GS}= -4V, I_{SD}=25A$                                                  | $V_{SD}$     | --   | 4.2  | --  | V          |
|                                    | $V_{GS}= -4V, I_{SD}=25A, T_J=150^\circ C$                                 |              | --   | 3.8  | --  |            |
| Peak Reverse Recovery Current      | $V_R=1700V, I_{SD}=20A$                                                    | $I_{rm}$     | --   | 8.9  | --  | A          |
| Reverse Recovery Time              |                                                                            | $T_{rr}$     | --   | 61   | --  | nS         |
| Reverse Recovery Charge            |                                                                            | $Q_{rr}$     | --   | 298  | --  | nC         |

### CHARACTERISTIC CURVES

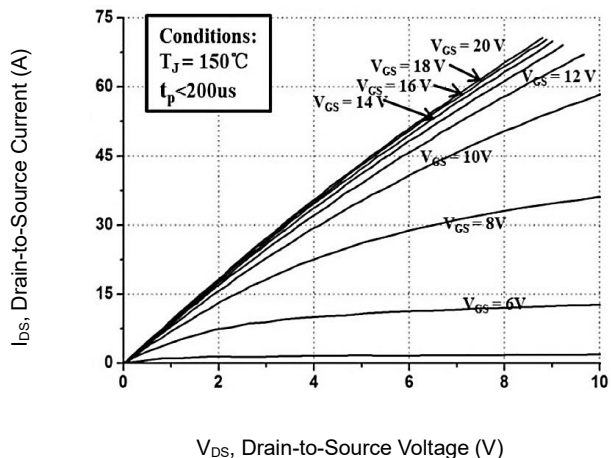
Output Characteristics



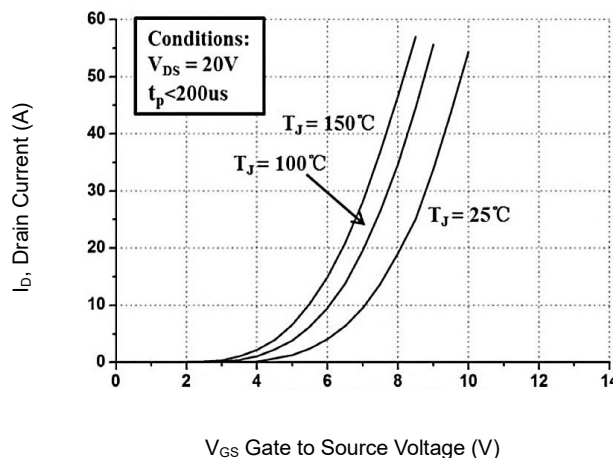
Output Characteristics



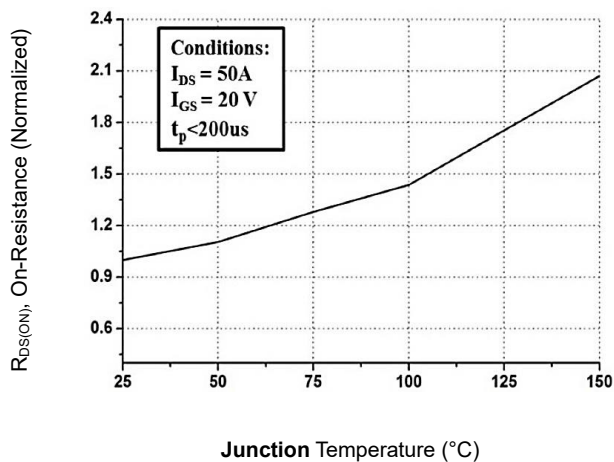
Output Characteristics



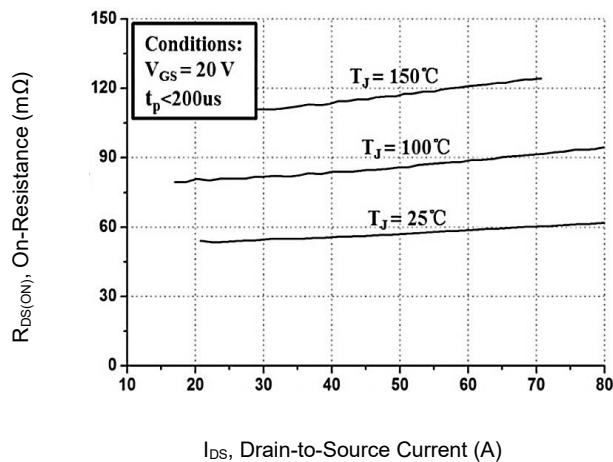
Transfer Characteristic



Normalized On-Resistance vs. Junction temperature

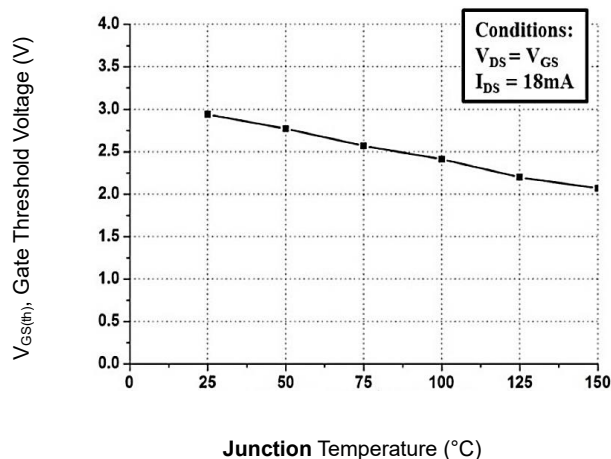


On-Resistance vs. Drain Current

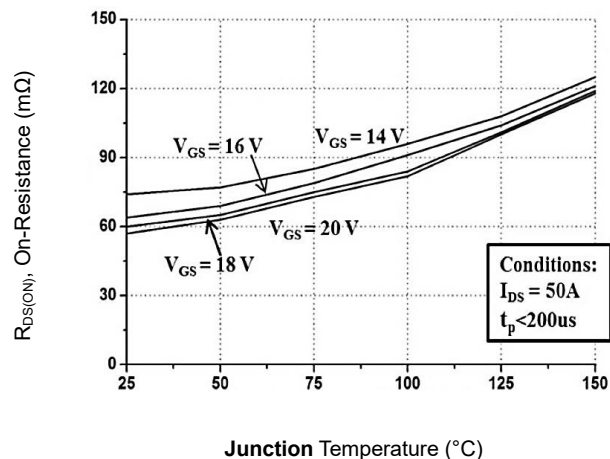


### CHARACTERISTIC CURVES

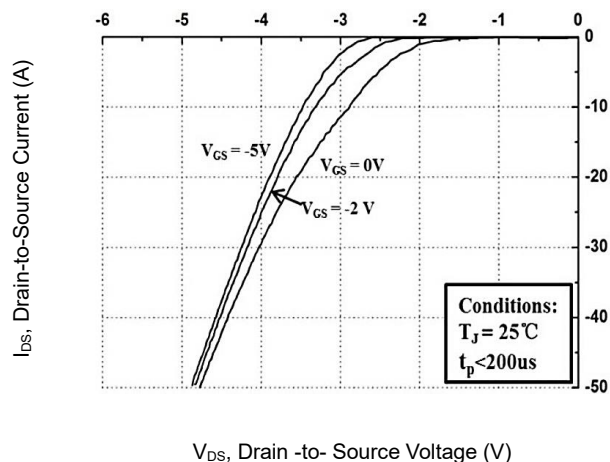
Threshold Voltage vs. Junction temperature



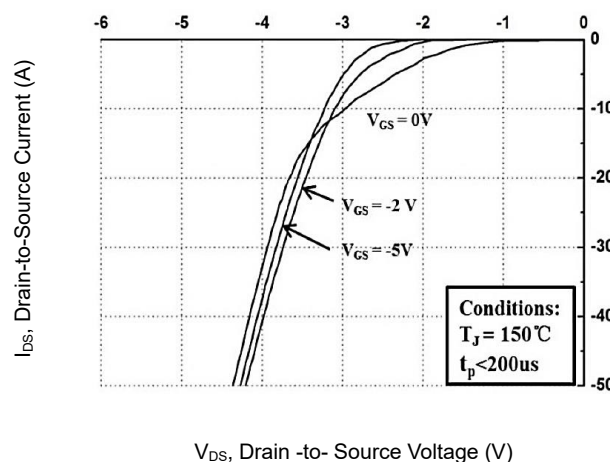
On-Resistance vs. Junction temperature for  $V_{GS}$



Body Diode Characteristics



Body Diode Characteristics



Power Dissipation vs. Drain Current

