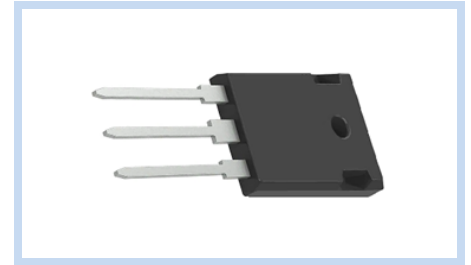# Silicon Carbide MOSFET
N-Channel 1200V 19A TO-247

MFTC120N19T247

MERITEK

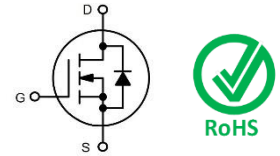## FEATURE

- $R_{DS(ON)}$<240mΩ at V_{GS}=18V, I_D=10A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery
- Applications: High Voltage DC/DC Converters, Switching Mode Power Supplier, Renewable Energy, Motor Drivers

MECHANICAL DATA

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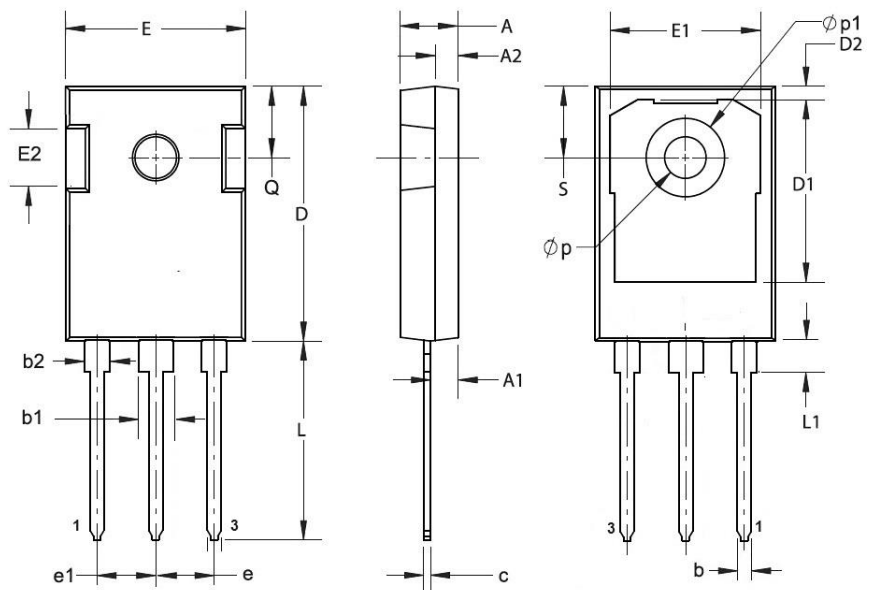- Terminals: Solderable per MIL-STD-750, Method 2026

MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	1200	V
Gate-Source Voltage	Dynamic (f >1Hz)	V_{GS}	-10/+25	V
	Static		-4/+18	
Drain Current – Continuous	V_{GS} =18V, T_C=25°C	I_D	19	A
	V_{GS} =18V, T_C=100°C		14	
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	31	A
	at 100μs		68	
Power Dissipation		P_D	91	W
Thermal Resistance, Junction to Case		$R_{θJC}$	1.64	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

DIMENSION	Min	Max
A	4.80	5.20
A1	2.21	2.59
A2	1.85	2.15
b	1.11	1.36
b1	2.91	3.21
b2	1.91	2.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
e	5.44 BSC	
e1	5.44 BSC	
E	15.50	16.10
L	19.62	20.22
L1	--	4.30
p	3.40	3.80
p1	--	7.30
Q	6.15 BSC	

Note: Pin Layout: 1:Gate(G), 2:Drain(D), 3:Source(S)

ELECTRICAL CHARACTERISTICS

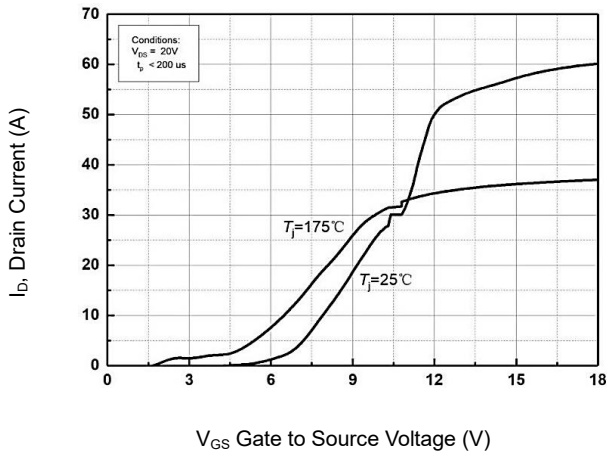| Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100µA	BV_{DSS}	1200	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=1200V, V_{GS}=0V	I_{DSS}	--	1	50	µA
Gate-Body Leakage Current	V_{GS}=18V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=18V, I_D=10A	$R_{DS(ON)}$	--	165	240	mΩ
	V_{GS}=20V, I_D=10A		--	160	--	
	V_{GS}=18V, I_D=10A, T_J=175°C			330		
	V_{GS}=20V, I_D=10A, T_J=175°C			320		
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=2.5mA	$V_{GS(th)}$	--	3	--	V
	V_{GS}=V_{DS}, I_D=2.5mA, T_J=175°C		--	2	--	
Transconductance	V_{GS}=18V, I_D=10A	g_{FS}	--	9.7	--	S
	V_{GS}=18V, I_D=10A, T_J=175°C		--	6	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=800V, I_D=10A V_{GS}= -4/+18V	Q_g	--	41	--	nC
Gate-Source Charge		Q_{gs}	--	8.4	--	
Gate-Drain Charge		Q_{gd}	--	15	--	
Input Capacitance	V_{DS}=1000V, V_{GS}=0V V_{AC}=25mV, f=1MHz	C_{iss}	--	730	--	pF
Output Capacitance		C_{oss}	--	24	--	
Reverse Transfer Capacitance		C_{rss}	--	1	--	
Internal Gate Resistance	V_{AC}=25mV, f=1MHz	$R_{G(int)}$	--	3	--	Ω
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Forward Current	V_{GS}= -4V, T_C=25°C	I_S	--	--	19	A
Diode Forward Current - Pulse with tp Limited by Tjmax	V_{GS}= -4V	$I_{S,Pulse}$	--	31	--	A
Drain-Source Diode Forward Voltage	V_{GS}= -4V, I_{SD}=3A	V_{SD}	--	2.8	--	V
	V_{GS}= -4V, I_{SD}=3A, T_J=175°C		--	2.5	--	

CHARACTERISTIC CURVES
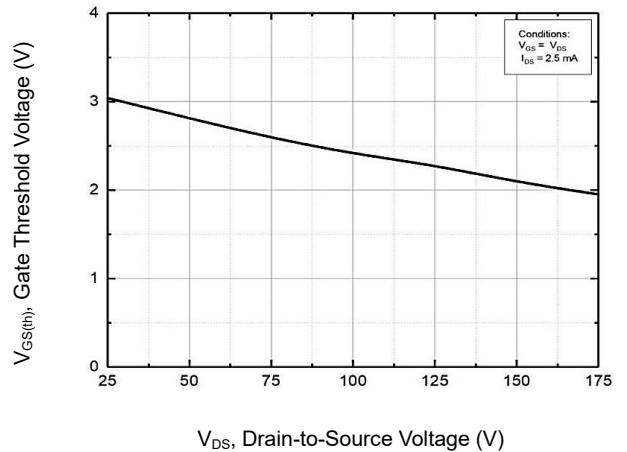
Output Characteristics

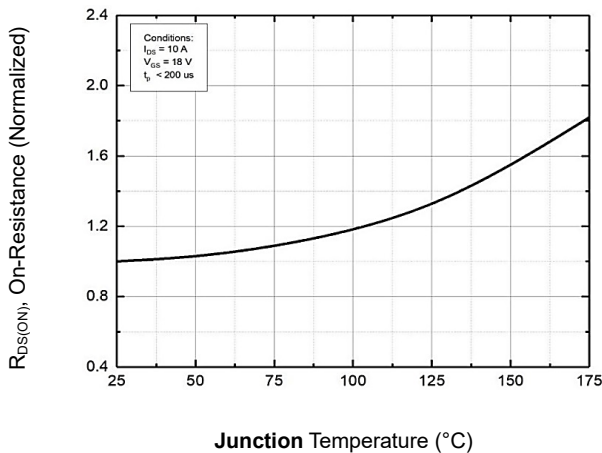

Output Characteristics

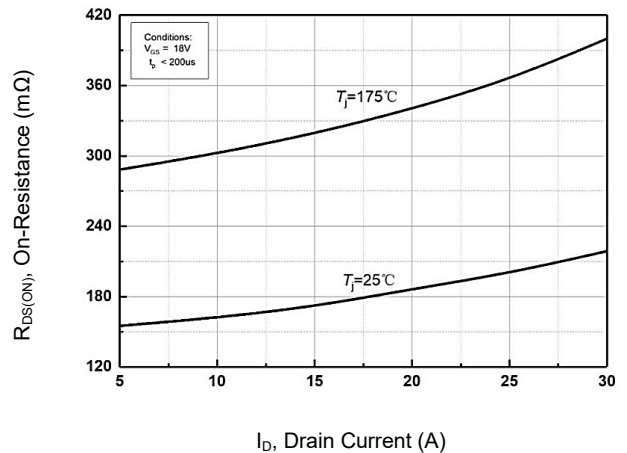

Transfer Characteristic

Threshold Voltage vs. Junction temperature

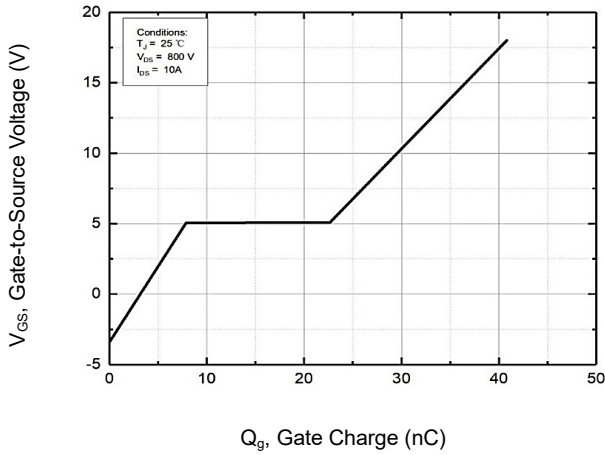**Normalized On-Resistance vs. Junction temperature**
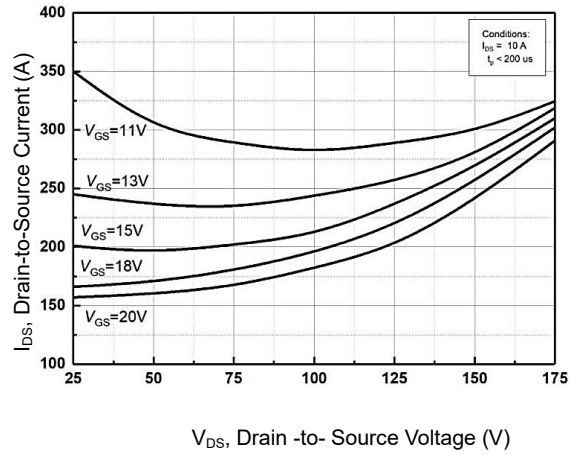

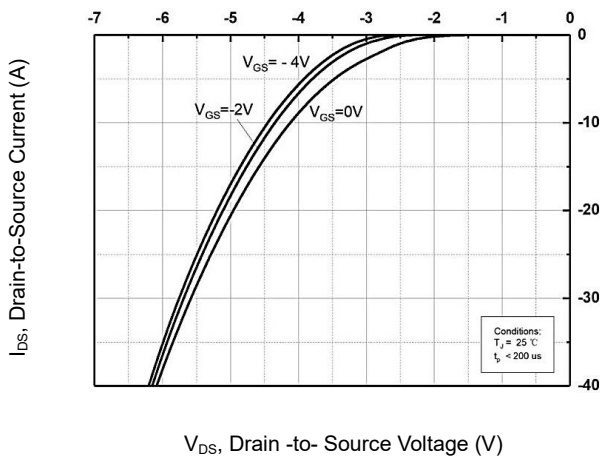**On-Resistance vs. Drain Current**
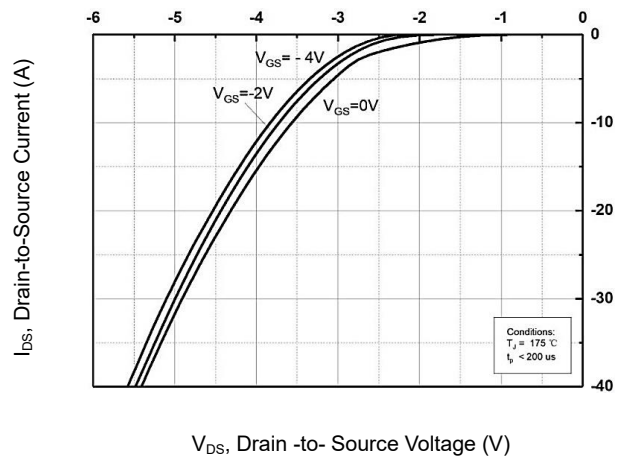
CHARACTERISTIC CURVES

Gate-Charge Characteristics

Conditions:
T_J = 25 ℃
V_{DS} = 800 V
I_{DS} = 10A

V_{GS}, Gate-to-Source Voltage (V)

Q_g, Gate Charge (nC)

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

Conditions:
I_{DS} = 10 A
t_p < 200 us

V_{GS}=11V
V_{GS}=13V
V_{GS}=15V
V_{GS}=18V
V_{GS}=20V

I_{DS}, Drain-to-Source Current (A)

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

Body Diode Characteristics

V_{GS}= - 4V
V_{GS}=-2V
V_{GS}=0V

Conditions:
T_J = 25 ℃
t_p < 200 us

I_{DS}, Drain-to-Source Current (A)

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

Body Diode Characteristics

V_{GS}= - 4V
V_{GS}=-2V
V_{GS}=0V

Conditions:
T_J = 175 ℃
t_p < 200 us

I_{DS}, Drain-to-Source Current (A)

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

Maximum Power Dissipation Derating

Conditions:
T_J <= 175 ℃

P_D, Power Dissipation (W)

Case Temperature (°C)

Continuous Drain Current vs. Case Temperature
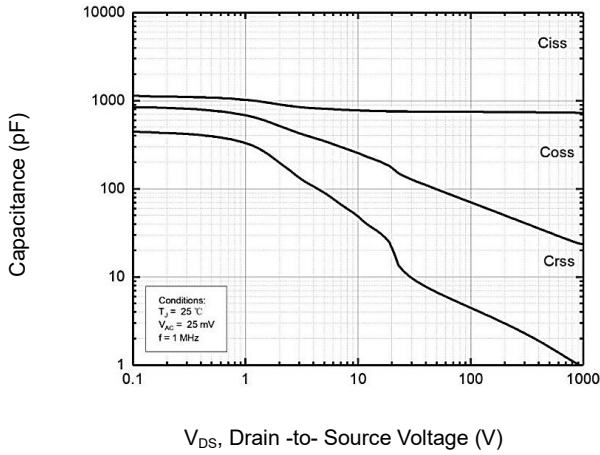

Conditions:
T_J <= 175 ℃

I_{DS}, Continuous Drain Current (A)

Case Temperature (°C)

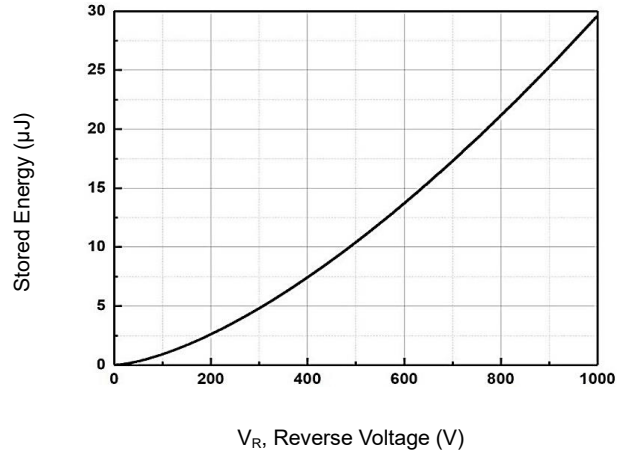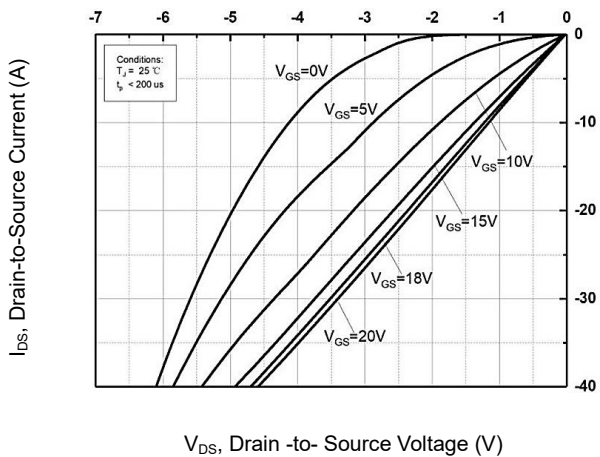## CHARACTERISTIC CURVES

Capacitance vs. Drain-Source Voltage

Output Capacitor Stored Energy

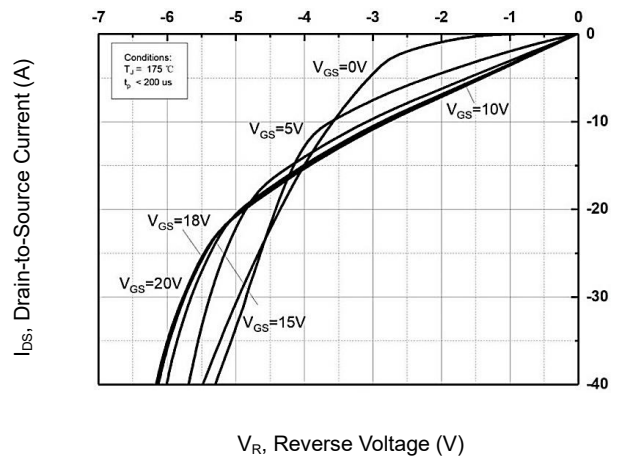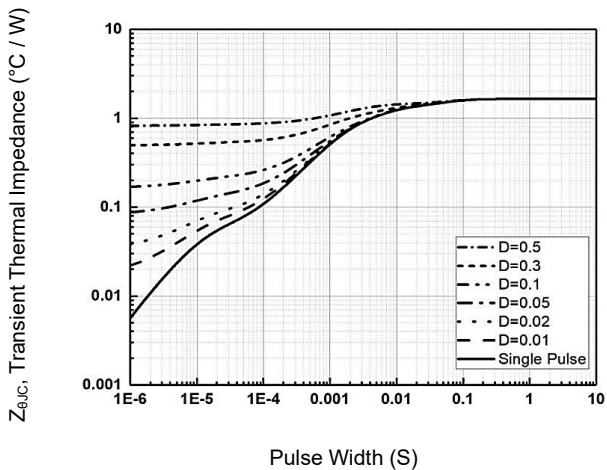**3rd Quadrant Characteristics**

3rd Quadrant Characteristics

Transient Thermal Impedance

Safe Operating Area