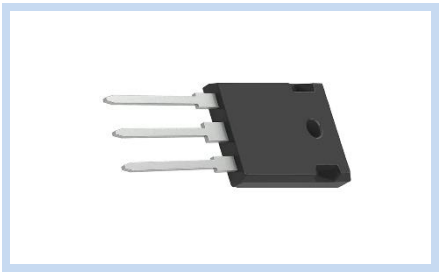
Silicon Carbide Power MOSFET
1200V 60A N-Channel TO-247

MFTC120N60T247

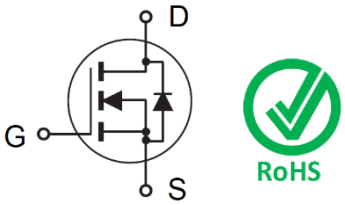
MERITEK

FEATURE



- $R_{DS(ON)}$<55mΩ at V_{GS}=20V, I_D=30A
- High Blocking Voltage with Ultra Low $R_{DS(ON)}$
- High Speed Switching with Low Capactiance
- Avalanch Ruggedness
- Benefits: Higher System Efficiency, Increased Power Density and System Switching Frequency, Reduced Cooling Requirement

Applications



RoHS

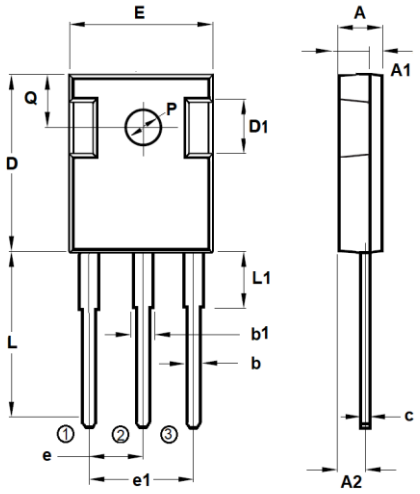
- High Voltage DC/DC Converters
- Solar inverters and Batter Charger
- Switch Mode Power Supplier
- Motor Drive

MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	-10/+25	V
Drain Current – Continuous		I_D	60	A
			40	A
Drain Current – Pulsed		I_{DM}	156	A
Power Dissipation	T_C=25°C	P_D	357	W
	Derate above 25°C		2.9	W/°C
Single Pulsed Avalanche Energy		E_{AS}	735	mJ
Single Pulsed Avalanche Current		I_{AS}	7	A
Thermal Resistance, Junction to Ambient		$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.35	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

DIMENSIONS

Item	Min (mm)	Max (mm)
A	4.70	5.31
A1	1.5	2.49
b	0.99	1.40
b1	1.65	2.39
c	0.38	0.89
D	20.3	21.46
D1	4.32	5.49
E	15.45	16.26
e	5.45	--
E1	10.9	--
L	19.81	20.57
L1	--	4.50
P	3.50	3.70
Q	5.38	6.20



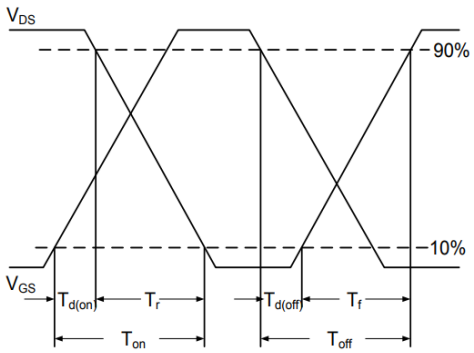
Note: Pin Layout: 1 :Gate, 2: Drain, 3: Source

ELECTRICAL CHARACTERISTICS

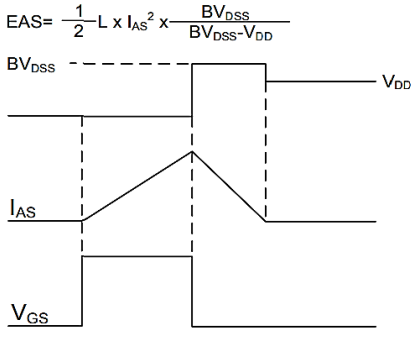
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	--	1	μA
Gate-Body Leakage Current, Forward	V_{GS}=30V, V_{DS}=0V	I_{GSSF}	--	--	100	nA
Gate-Body Leakage Current, Reverse	V_{GS}=-30V, V_{DS}=0V	I_{GSSR}	--	--	-100	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A	$R_{DS(ON)}$	--	0.08	0.095	Ω
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	$V_{GS(th)}$	2.5	--	4.5	V
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=520V, V_{GS}=10V, I_D=20A	Q_g	--	69	--	nC
Gate-Source Charge		Q_{gs}	--	12	--	nC
Gate-Drain Charge		Q_{gd}	--	30	--	nC
Turn-On Delay Time	V_{DD}=520V, V_{GS}=10V, R_G=6Ω I_D=20A	$T_{d(on)}$	--	37	--	ns
Rise Time		T_r	--	17	--	ns
Turn-Off Delay Time		$T_{d(off)}$	--	95	--	ns
Fall Time		T_f	--	9	--	ns
Input Capacitance	V_{DS}=150V, V_{GS}=0V, F=1MHz	C_{iss}	--	1915	--	pF
Output Capacitance		C_{oss}	--	110	--	pF
Reverse Transfer Capacitance		C_{rss}	--	5	--	pF
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Drain-Source Diode Forward Current	--	I_S	--	--	39	A
Diode Forward Voltage	V_{GS}=0V, I_S=20A, T_J=25°C	V_{SD}	--	--	1.5	V
Reverse Recovery Time	V_R=25V, I_F=10A, dI_F/dt=100A/us	T_{rr}	--	324	--	ns
Reverse Recovery Charge		Q_{rr}	--	4.2	--	μC

Note:
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
3. Guaranteed by design, not subject to production testing.
4. L=30mH, I_{AS} = 7A, V_{DD}= 60V, R_G=25Ω, Starting T_J=25°C

Switching Time Waveform

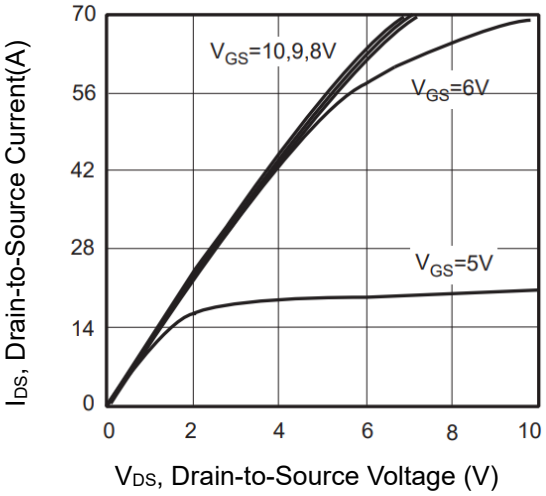


EAS Waveform

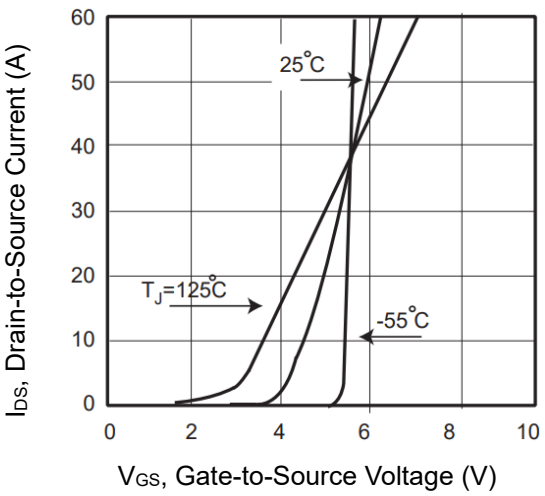


CHARACTERISTIC CURVES

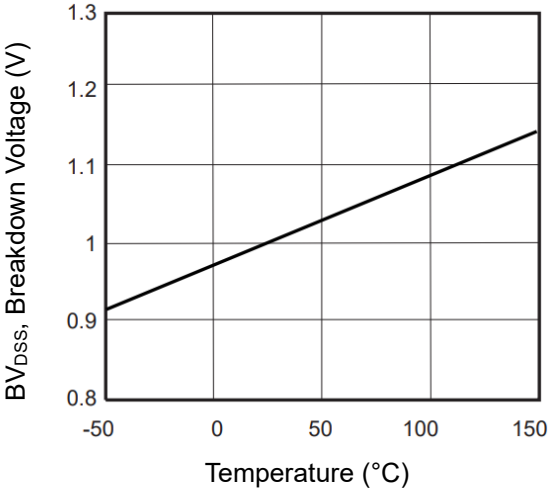
Output Characteristics



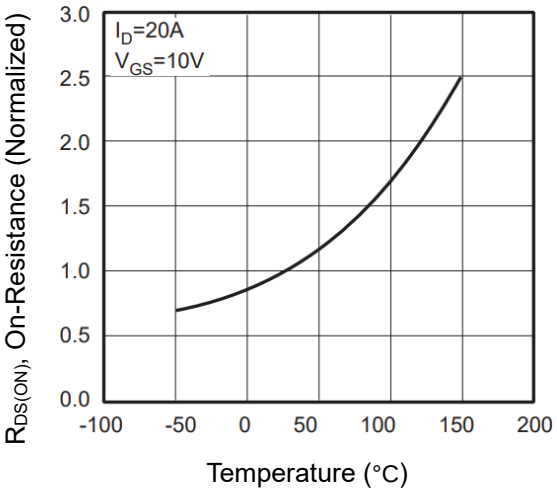
Transfer Characteristics



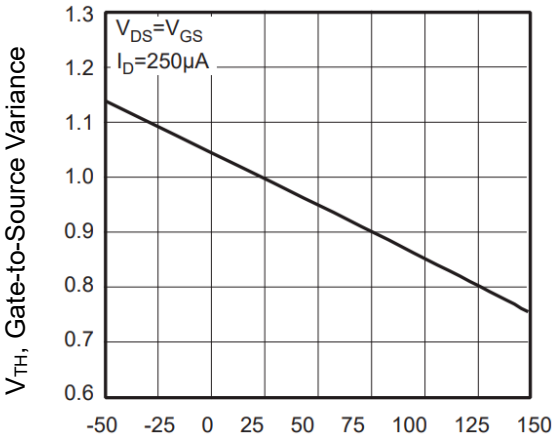
Breakdown Voltage Variation vs. Temperature



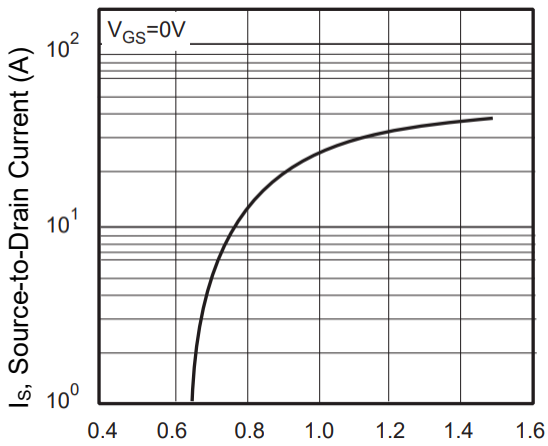
On-Resistance vs. Junction temperature



Threshold Voltage vs. Temperature



Body Diode Characteristics

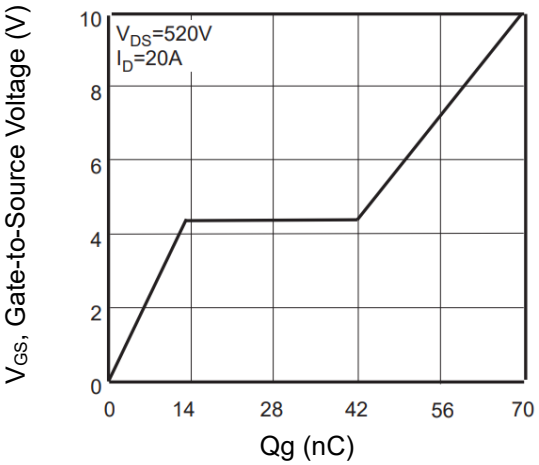


Temperature(°C)

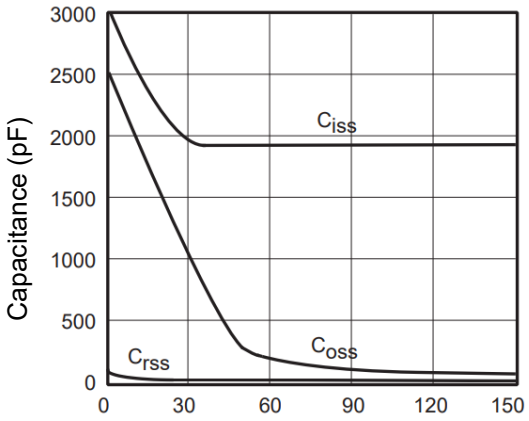
V_{SD}, Source-to-Drain Voltage (V)

CHARACTERISTIC CURVES

Gate-Charge Characteristics

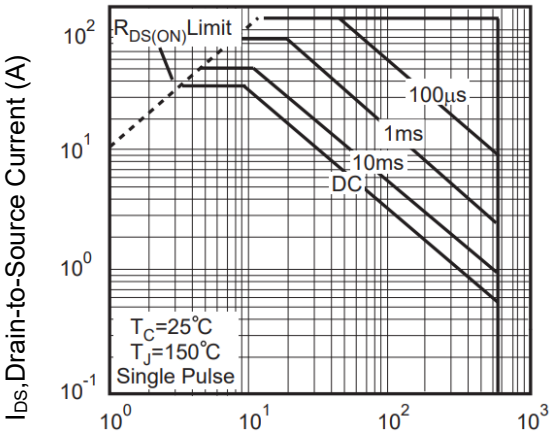


Capacitance vs. Drain-Source Voltage



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

Maximum Safe Operating Area



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

Normalized Transient Thermal Impedance Curve