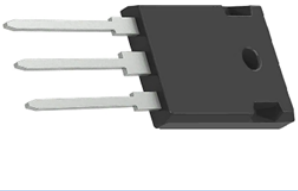
Silicon Carbide MOSFET
N-Channel 650V 55A TO-247

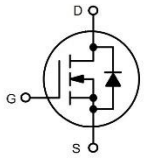
MFTC65N55T247

MERITEK

FEATURE

- $R_{DS(ON)}$<58mΩ at V_{GS}=20V, I_D=20A
- 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 Drives





RoHS

MECHANICAL DATA

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

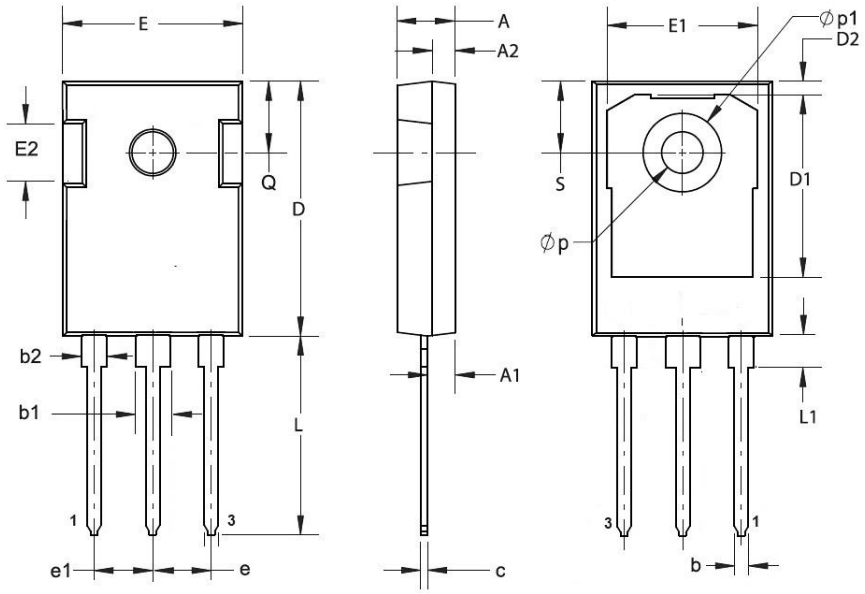
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	650	V
Gate-Source Voltage	Dynamic (f >1Hz)	V_{GS}	-10/+25	V
	Static		-4/+20	
Drain Current – Continuous	V_{GS} =20V, T_C=25°C	I_D	55	A
	V_{GS} =20V, T_C=100°C		39	
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	95	A
	at 100μs		231	
Power Dissipation		P_D	208	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.72	°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)

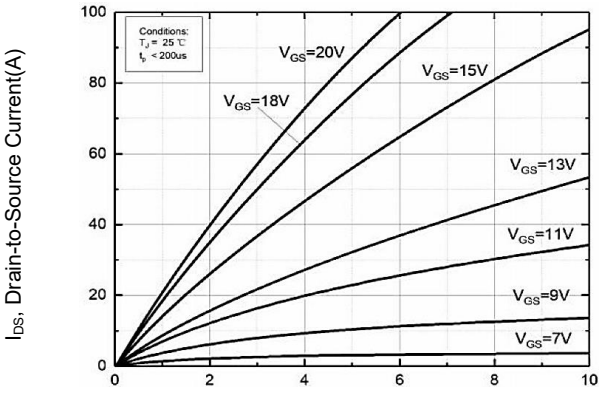


ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100μA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	--	50	μA
Gate-Body Leakage Current	V_{GS}=20V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=20V, I_D=20A	$R_{DS(ON)}$	--	45	58	mΩ
	V_{GS}=20V, I_D=20A, T_J=175°C		--	60	--	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=5mA	$V_{GS(th)}$	--	2.7	--	V
	V_{GS}=V_{DS}, I_D=5mA, T_J=175°C		--	1.8	--	
Transconductance	V_{GS}=20V, I_D=20A	g_{FS}	--	18	--	S
	V_{GS}=20V, I_D=20A, T_J=175°C		--	11	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=400V, I_D=40A, V_{GS}= -4/+18V	Q_g	--	66.2	--	nC
Gate-Source Charge		Q_{gs}	--	16.4	--	
Gate-Drain Charge		Q_{gd}	--	16.5	--	
Turn-On Delay Time	V_{DS}=400V, I_D=40A, L=100μH V_{GS}= -4/+18V, R_{GEN}=2.5Ω	$T_{d(on)}$	--	11.3	--	nS
Rise Time		T_r	--	9.8	--	
Turn-Off Delay Time		$T_{d(off)}$	--	18	--	
Fall Time		T_f	--	9	--	
Turn-On Switching Loss		E_{ON}	--	53	--	μJ
Turn-Off Switching Loss		E_{OFF}	--	50	--	
Totel Switching Loss		E_{TOT}	--	103	--	
Input Capacitance	V_{DS}=600V, V_{GS}=0V, V_{AC}=25mV f=1MHz	C_{iss}	--	1410	--	pF
Output Capacitance		C_{oss}	--	119	--	
Reverse Transfer Capacitance		C_{rss}	--	4	--	
Internal Gate Resistance	V_{AC}=25mV, f=1MHz	$R_{G(int)}$	--	1.8	--	Ω
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Forward Current	V_{GS}= -4V, T_C=25°C	I_S	--	30	--	A
Drain-Source Diode Forward Voltage	V_{GS}= -4V, I_{SD}=8.8A	V_{SD}	--	3.7	--	V
	V_{GS}= -4V, I_{SD}=8.8A, T_J=175°C		--	3.1	--	

CHARACTERISTIC CURVES

Output Characteristics



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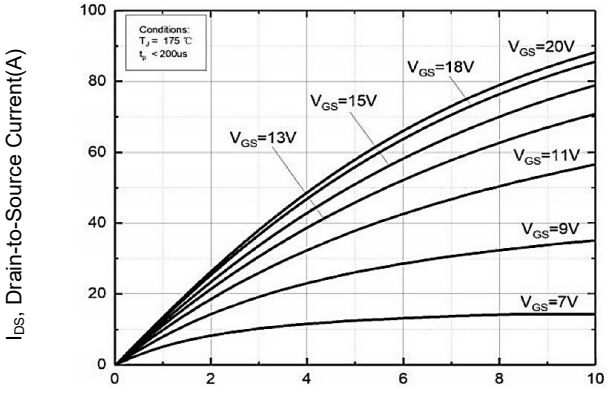
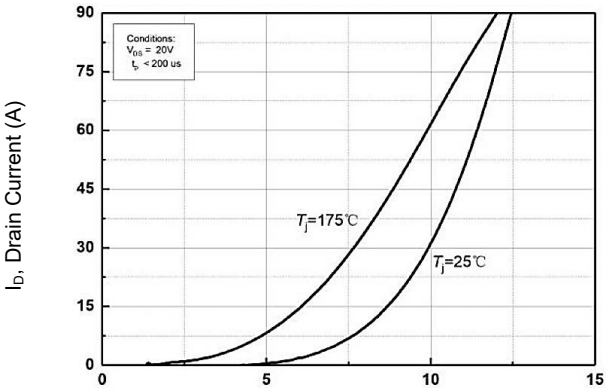
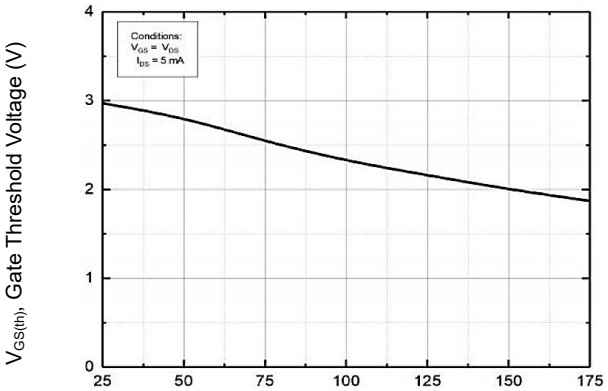


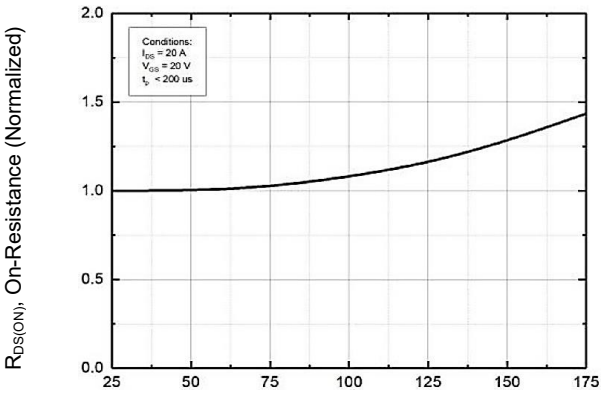
Transfer Characteristic



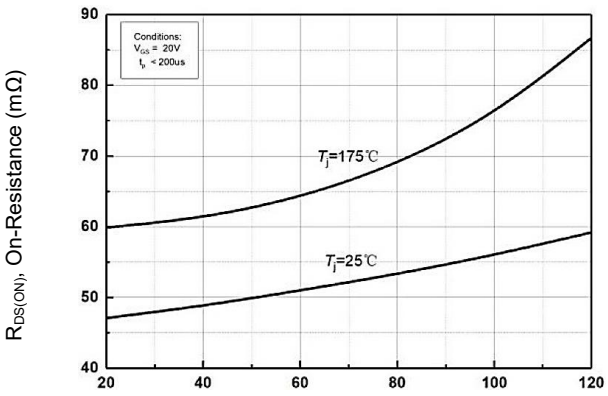
Threshold Voltage vs. Junction temperature



Normalized On-Resistance vs. Junction temperature

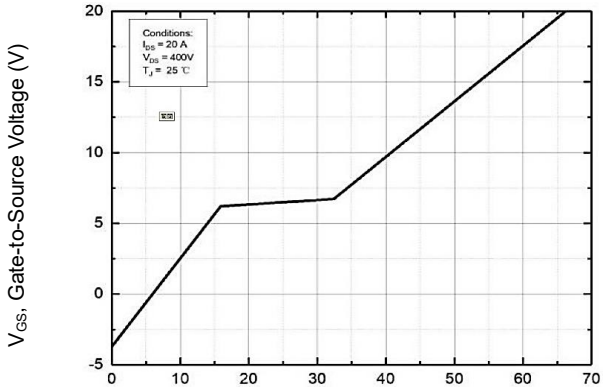


On-Resistance vs. Drain Current

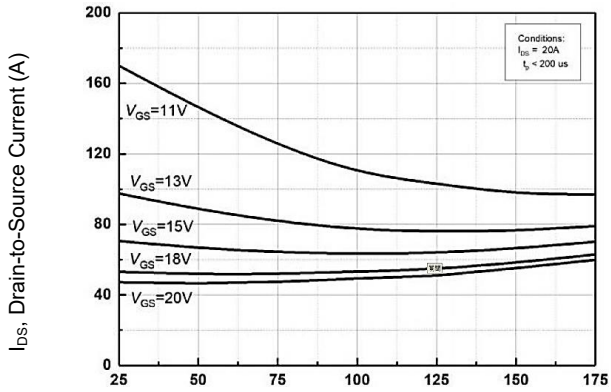


CHARACTERISTIC CURVES

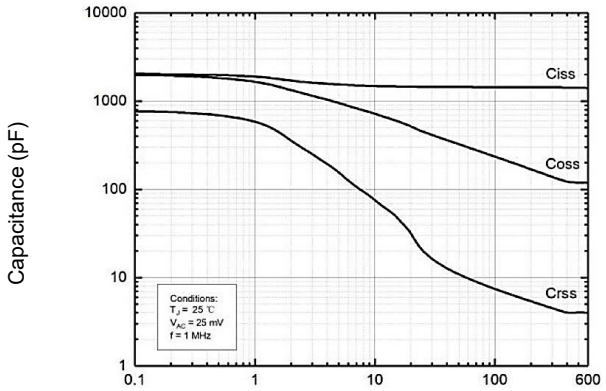
Gate-Charge Characteristics



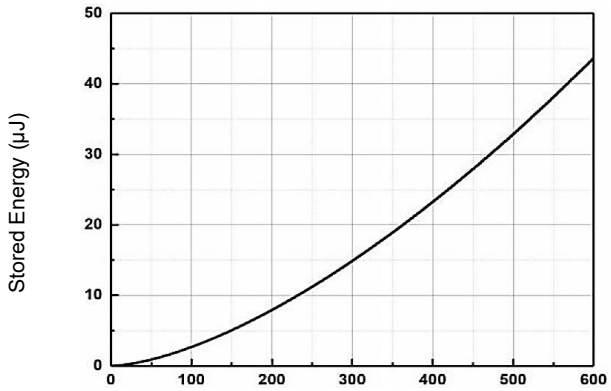
On-Resistance vs. Junction temperature for V_{GS}



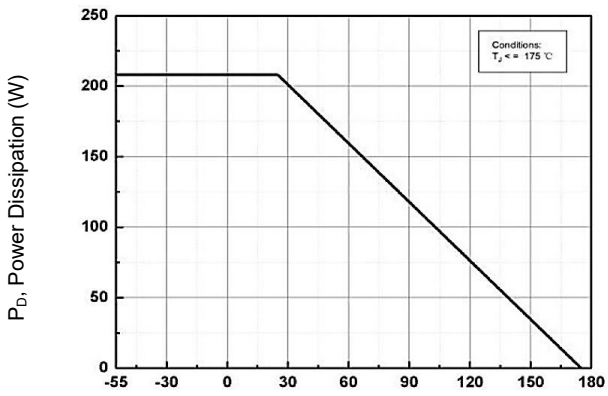
Capacitance vs. Drain-Source Voltage



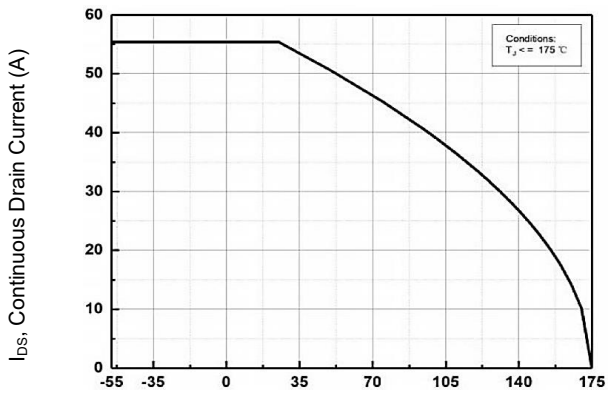
Output Capacitor Stored Energy



Maximum Power Dissipation Derating

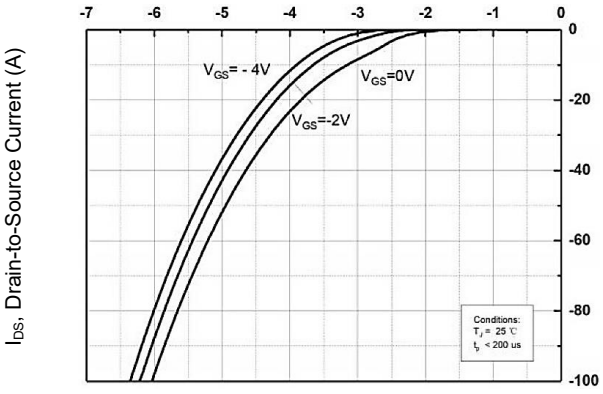


Continuous Drain Current vs. Case Temperature



CHARACTERISTIC CURVES

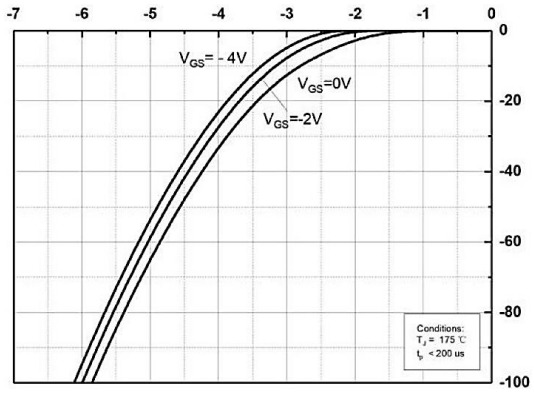
Body Diode Characteristics



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

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

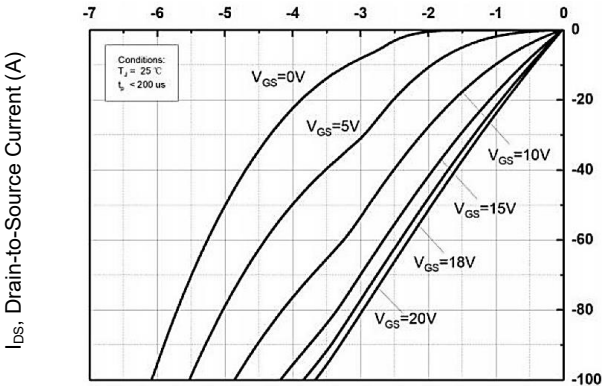
Body Diode Characteristics



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

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

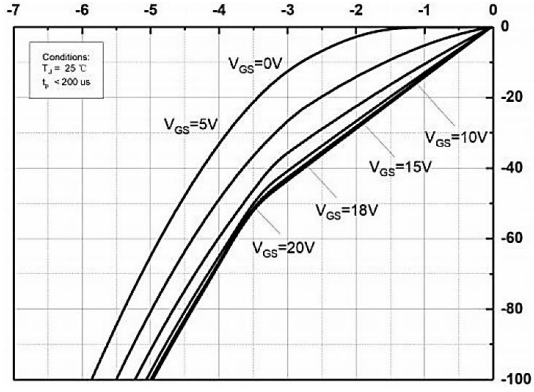
3rd Quadrant Characteristics



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

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

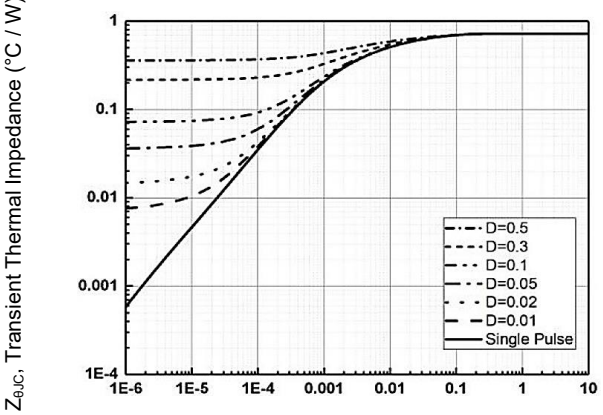
3rd Quadrant Characteristics



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

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

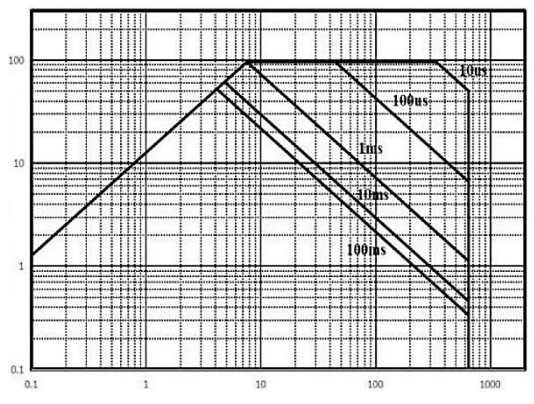
Transient Thermal Impedance



$Z_{\theta JC}$, Transient Thermal Impedance (°C / W)

Pulse Width (S)

Safe Operating Area



I_D, Drain Current (A)

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