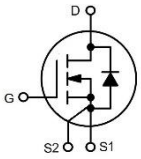
Silicon Carbide MOSFET
N-Channel 650V 55A TO-247-4

MFTC65N55T2474

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 Charge
- Applications: High Voltage DC-DC Converter, EV Battery Chargers, Switching Mode Power Supplier, Renewable Energy



RoHS

MECHANICAL DATA

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

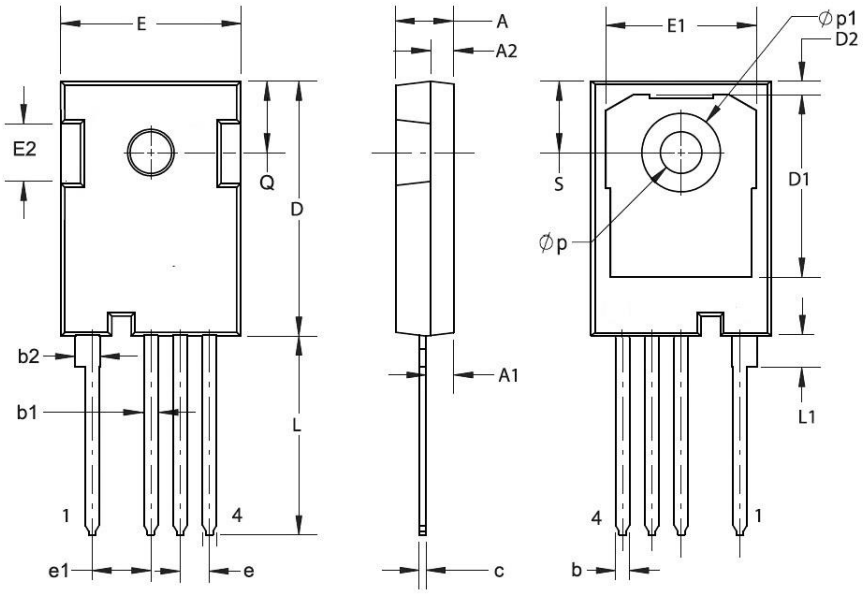
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	650	V
Gate-Source Voltage	Dynamic (f >1Hz)	V_{GS}	-10/+25	V
	Static		-4/+20	
Continuous Drain Current	V_{GS}=20V, T_C=25°C	I_D	55	A
	V_{GS}=20V, T_C=100°C		39	A
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	95	A
	at 100μs		231	
Power Dissipation	T_C=25°C	P_D	208	W
Thermal Resistance, Junction to Case		$R_{θJC}$	0.72	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

TO-247-4	Min (mm)	Max (mm)
A	4.80	5.21
A1	2.21	2.61
A2	1.80	2.20
b	1.06	1.36
b1	1.07	1.60
b2	2.33	2.94
c	0.51	0.75
D	23.30	23.60
D1	16.25	17.65
e	2.54 BSC	
e1	5.08 BSC	
E	15.74	16.14
E1	13.10	14.32
L	17.27	17.87
L1	3.97	4.39
p	3.40	3.80
p1	7.19 BSC	
Q	5.49	6.09

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

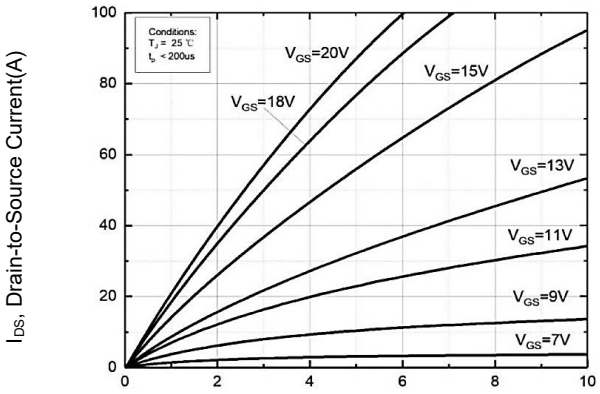


ELECTRICAL CHARACTERISTICS

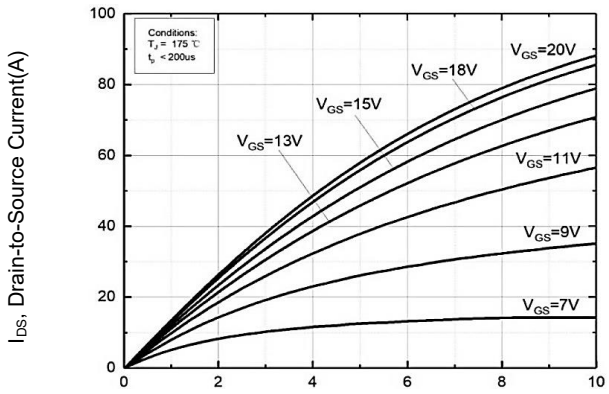
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100μA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	1	50	μA
Gate-Body Leakage Current	V_{GS}=20V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**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=20A, V_{GS}= -4/+20V	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=20A, L=276μH V_{GS}= -4/+20V, R_{GEN}=5Ω,	$T_{d(on)}$	--	10.3	--	nS
Rise Time		T_r	--	8.9	--	
Turn-Off Delay Time		$T_{d(off)}$	--	16.3	--	
Fall Time		T_f	--	8	--	
Turn-On Switching Loss		E_{ON}	--	47.9	--	μJ
Turn-Off Switching Loss		E_{OFF}	--	45.8	--	
Total Switching Energy		E_{TOT}	--	93.7	--	
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	--	
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
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	--	
Diode Forward Current - Continuous	V_{GS}= -4V, T_C=25°C	I_S	--	46	--	A
Peak Reverse Recovery Current	V_R=400V, I_{SD}=20A, V_{GS}= -4V, dif/dt = 2500A/μs	I_{rm}	--	11.6	--	A
Reverse Recovery Time		T_{rr}	--	31.7	--	nS
Reverse Recovery Charge		Q_{rr}	--	188.5	--	nC

CHARACTERISTIC CURVES

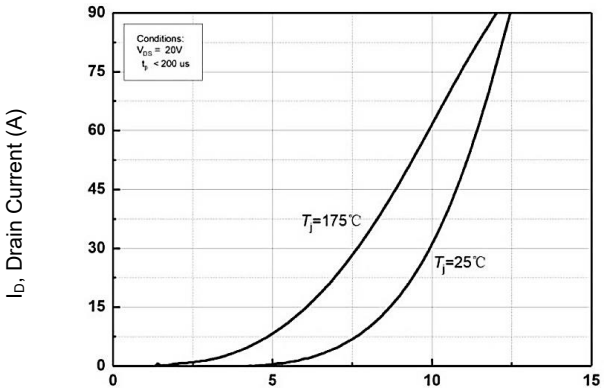
Output Characteristics



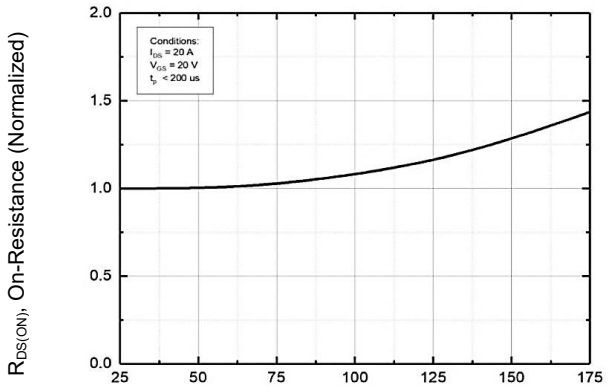
Output Characteristics



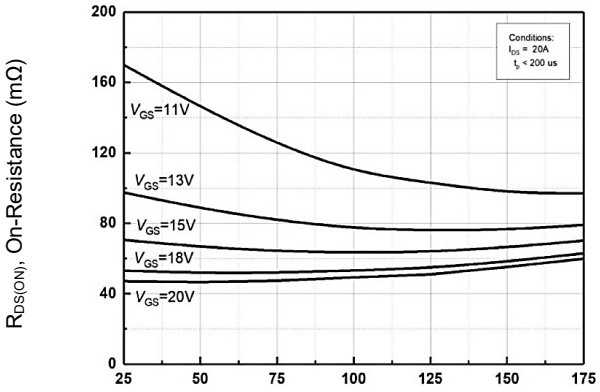
Transfer Characteristic



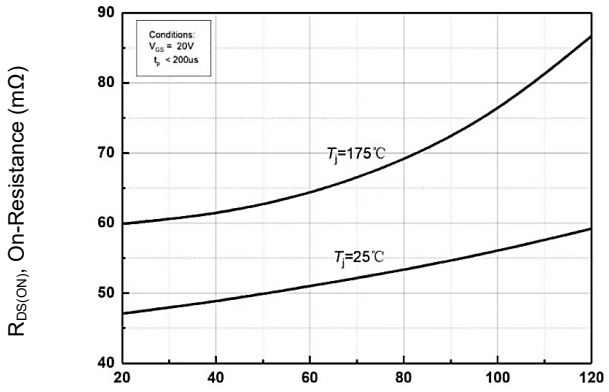
Normalized On-Resistance vs. Junction temperature



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

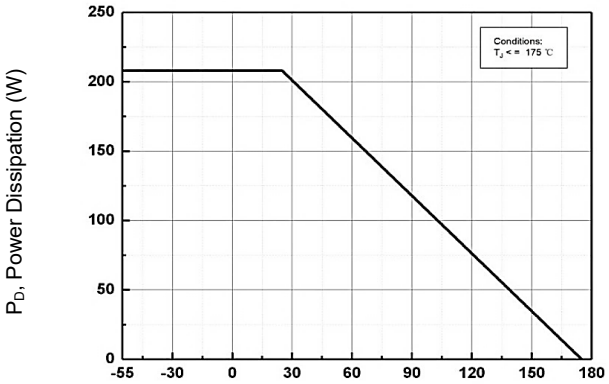


On-Resistance vs. Drain Current

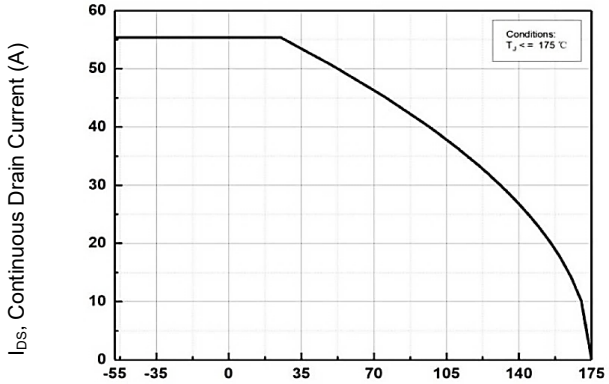


CHARACTERISTIC CURVES

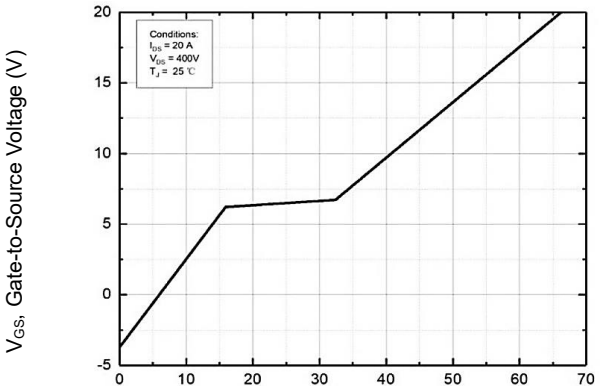
Maximum Power Dissipation Derating



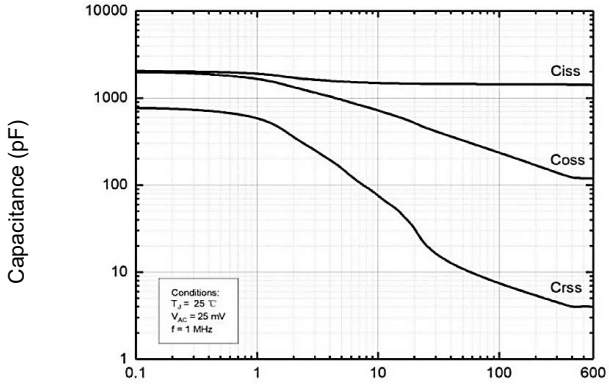
Continuous Drain Current vs. Case Temperature



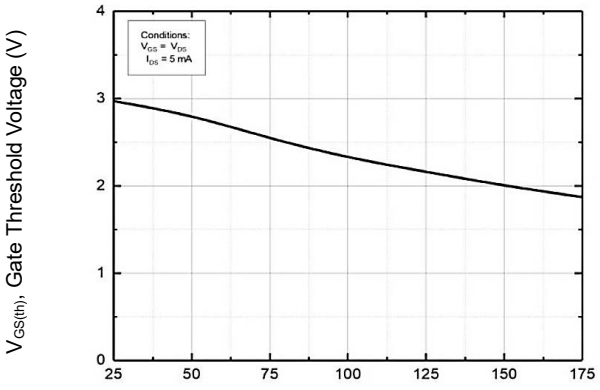
Gate-Charge Characteristics



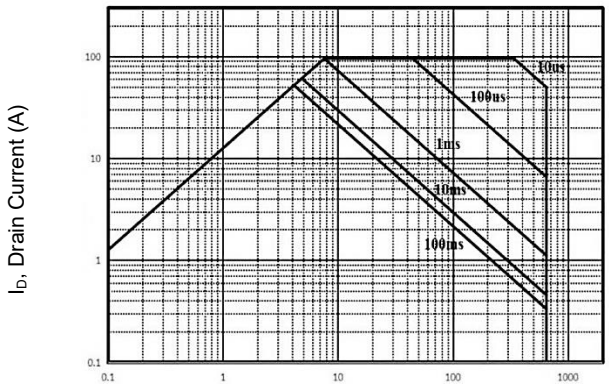
Capacitance vs. Drain-Source Voltage



Threshold Voltage vs. Junction temperature

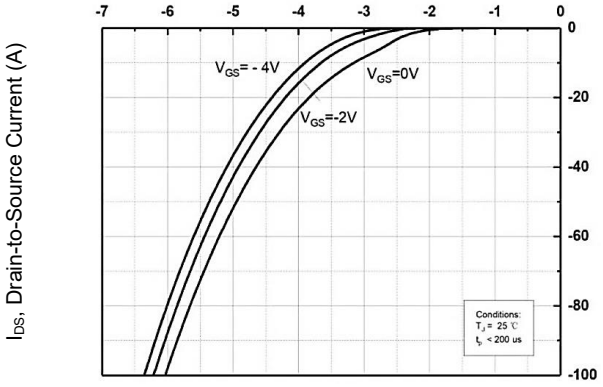


Safe Operating Area



CHARACTERISTIC CURVES

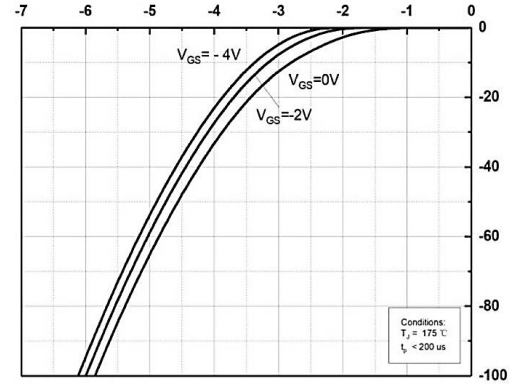
Body Diode Characteristics



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

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

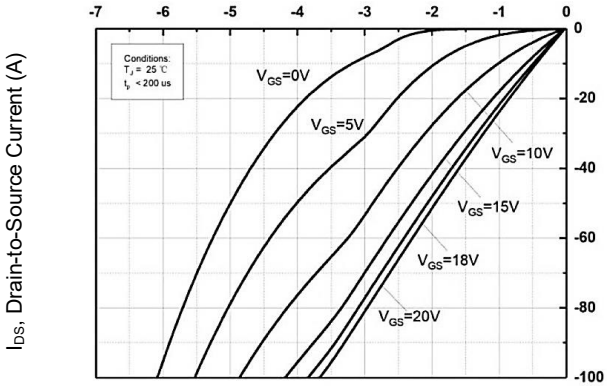
Body Diode Characteristics



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

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

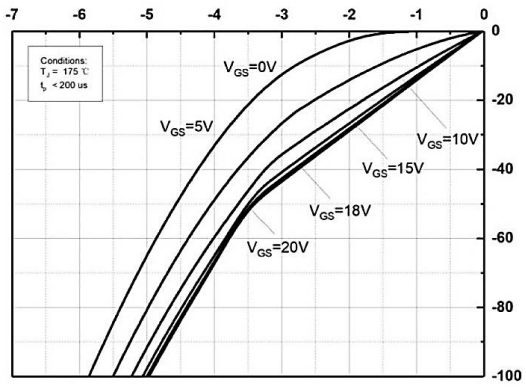
3rd Quadrant Characteristics



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

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

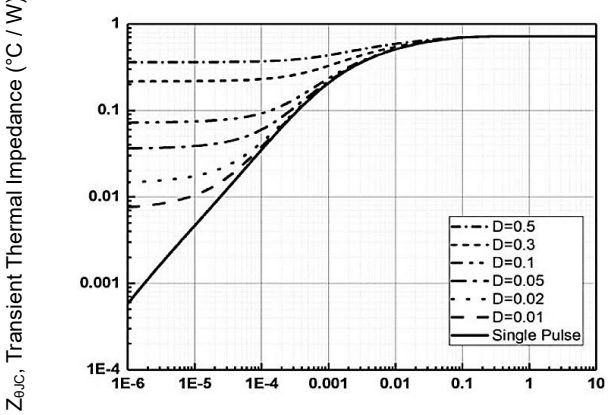
3rd Quadrant Characteristics



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

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

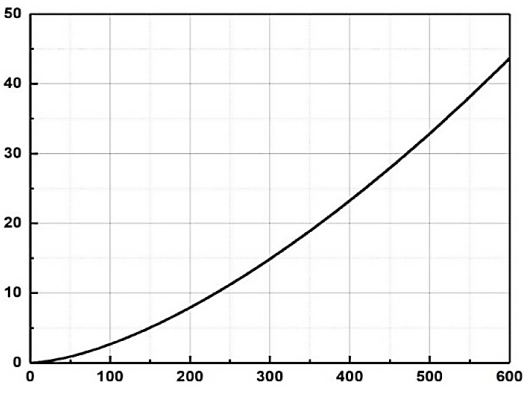
Transient Thermal Impedance



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

Pulse Width (S)

Output Capacitor Stored Energy

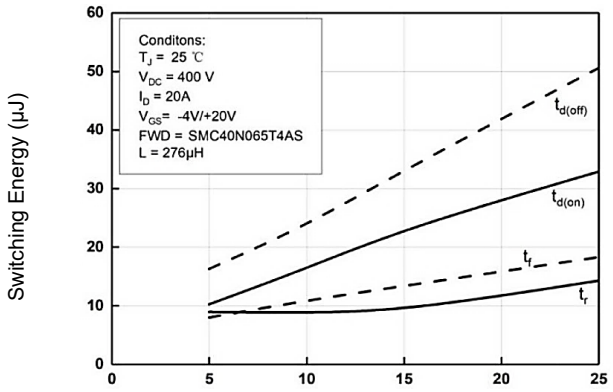


Stored Energy (μJ)

V_R, Reverse Voltage (V)

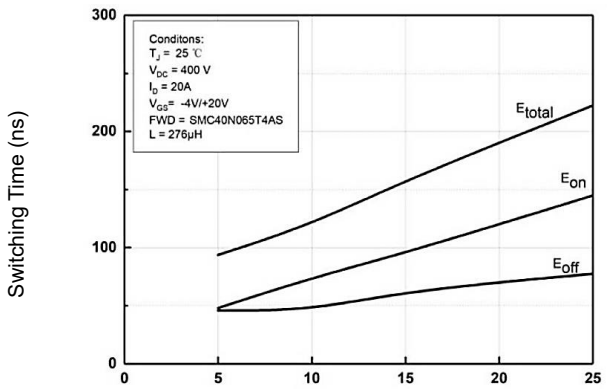
CHARACTERISTIC CURVES

Clamped Inductive Switching Energy vs $R_{G(EXT)}$



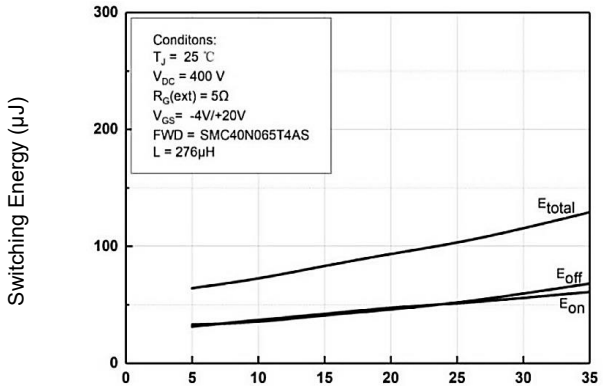
$R_{G(EXT)}$, External Gate Resistor (Ω)

Switching Timevs $R_{G(EXT)}$



$R_{G(EXT)}$, External Gate Resistor (Ω)

Clamped Inductive Switching Energy vs Drain current



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