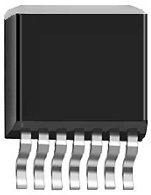
Silicon Carbide MOSFET
N-Channel 650V 31A TO-263-7

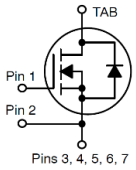
MFTC65N31T2637

MERITEK

FEATURE

- $R_{DS(ON)}$<150mΩ at V_{GS}=18V, I_D=10A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low Reverse Recovery Charge
- Applications: High Voltage DC-DC Converter, Switch Mode Power Supplier, Renewable Energy, Moter Drives





RoHS

MECHANICAL DATA

- Case: TO-263-7 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

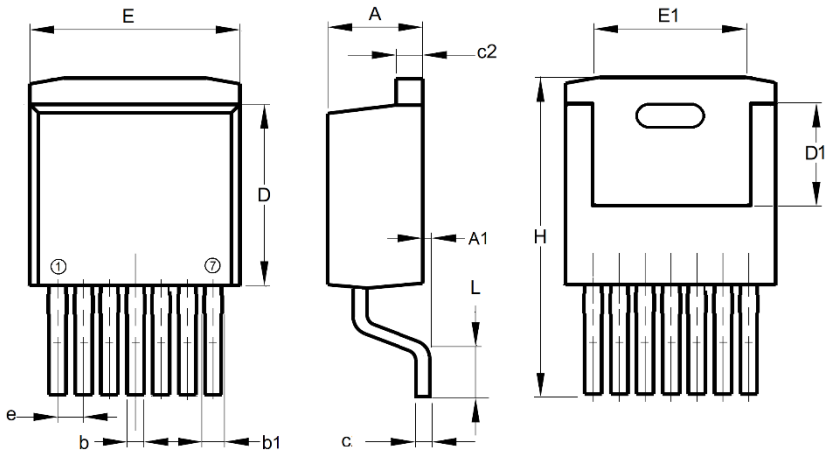
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	650	V
Gate-Source Voltage	Absolute Maximum Value	V_{GS}	-10/+25	V
	Recommended operational values		-4/+18	
Continuous Drain Current	V_{GS}=18V, T_C=25°C	I_D	31	A
	V_{GS}=18V, T_C=100°C		22	
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	53	A
	at 100μs		131	
Power Dissipation	T_C=25°C	P_D	130	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.15	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

DIMENSION	Min	Max
A	4.30	4.60
A1	0	0.25
b	0.50	0.70
b1	0.60	0.90
c	0.40	0.60
c2	1.20	1.40
D	8.88	9.28
D1	4.65	6.65
e	1.27 BSC	
E	10.08	10.28
E1	6.82	7.97
H	14.80	16.00
L	1.90	2.75

Note: Pin Layout: Tab: Drain; 1: Gate; 2: Driver Source; 3,4,5,6,7,8: Power Source

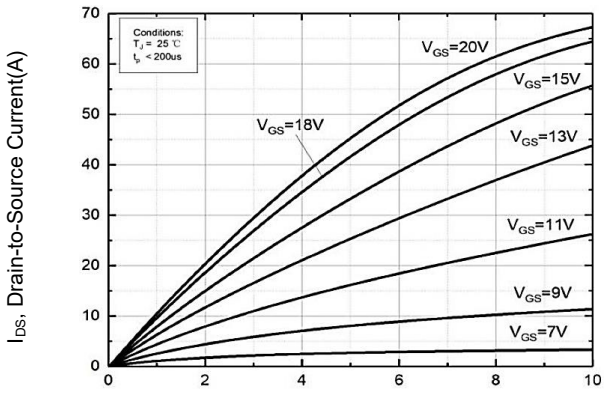


ELECTRICAL CHARACTERISTICS

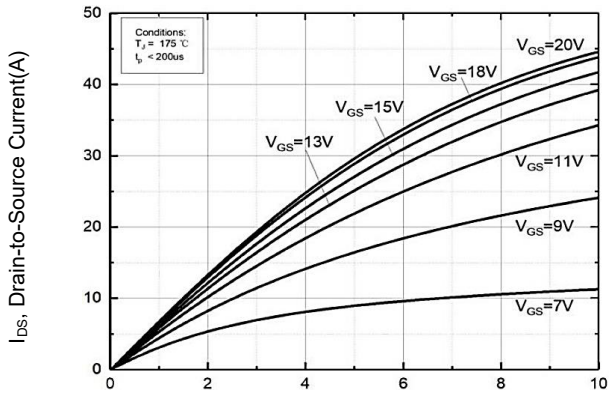
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100μA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	1	50	μA
Gate-Body Leakage Current	V_{GS}=20V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=18V, I_D=10A	$R_{DS(ON)}$	--	105	150	mΩ
	V_{GS}=20V, I_D=10A		--	94	--	
	V_{GS}=18V, I_D=10A, T_J=175°C		--	140	--	
	V_{GS}=20V, I_D=10A, T_J=175°C		--	130	--	
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=10A	g_{FS}	--	13	--	S
	V_{GS}=20V, I_D=10A, T_J=175°C		--	9	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=400V, I_D=10A, V_{GS}= -4/+18V	Q_g	--	35.8	--	nC
Gate-Source Charge		Q_{gs}	--	8.3	--	
Gate-Drain Charge		Q_{gd}	--	12.1	--	
Input Capacitance	V_{DS}=600V, V_{GS}=0V, V_{AC}=25mV f=1MHz	C_{iss}	--	767	--	pF
Output Capacitance		C_{oss}	--	55	--	
Reverse Transfer Capacitance		C_{rss}	--	7	--	
Internal Gate Resistance	V_{AC}=25mV, f=1MHz	$R_{DS(int)}$	--	2.8	--	Ω
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Drain-Source Diode Forward Voltage	V_{GS}= -5V, I_{SD}=7.5A	V_{SD}	--	4.0	--	V
	V_{GS}= -5V, I_{SD}=7.5A, T_J=175°C		--	3.5	--	
Diode Forward Current - Continuous	T_C=25°C	I_S	--	26	--	A
Diode Forward Current - Pulse with tp limited by Tjmax	V_{GS}= -5V	$I_{S,Pulse}$	--	53	--	A

CHARACTERISTIC CURVES

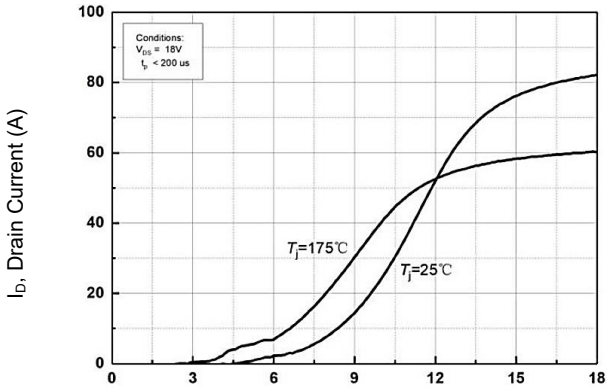
Output Characteristics



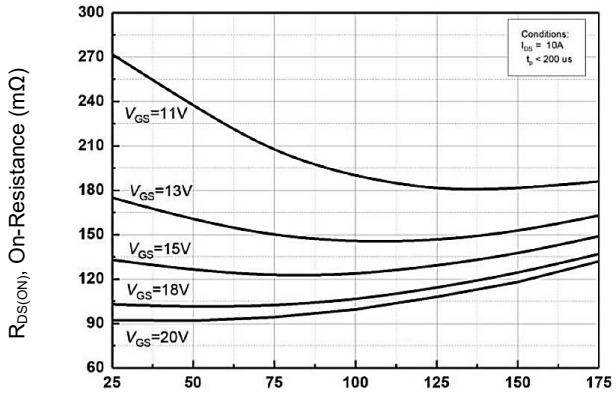
Output Characteristics



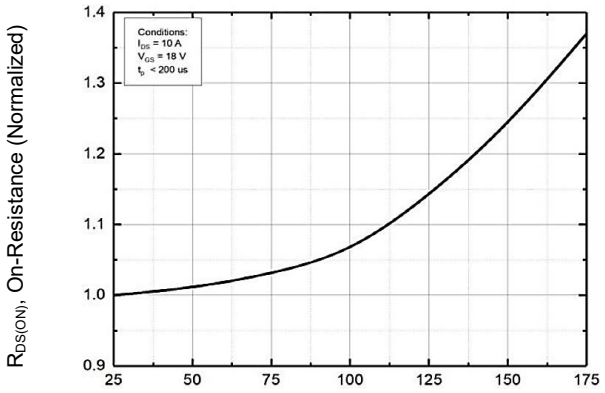
Transfer Characteristic



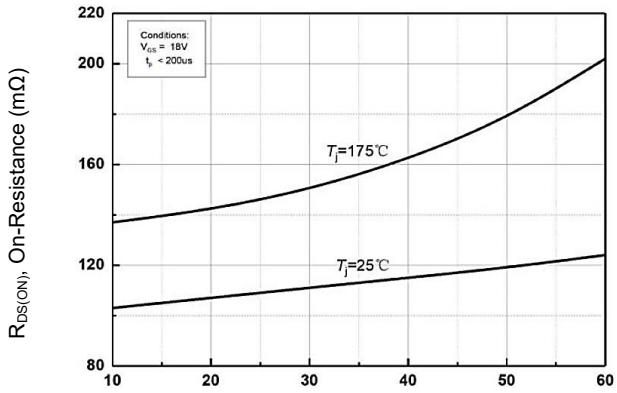
On-Resistance vs. Junction temperature for V_{GS}



Normalized On-Resistance vs. Junction temperature

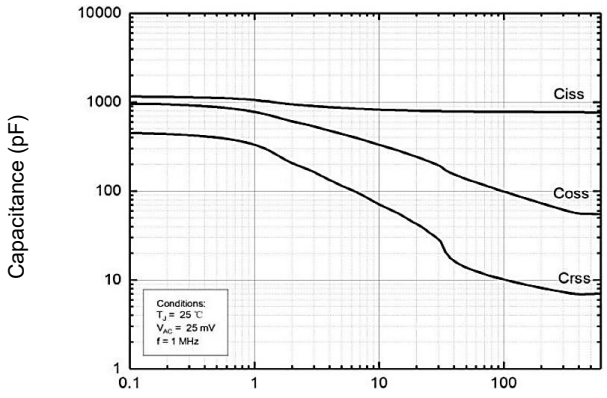


On-Resistance vs. Drain Current



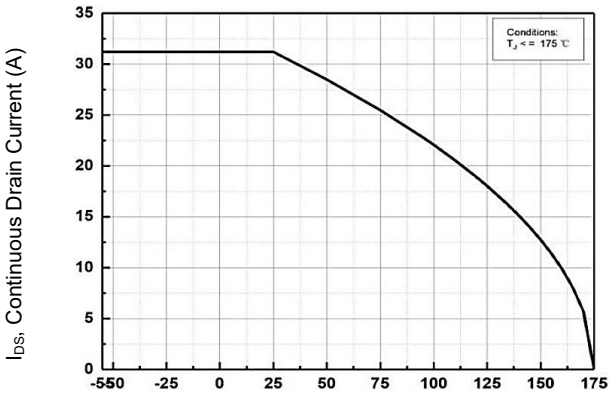
CHARACTERISTIC CURVES

Capacitance vs. Drain-Source Voltage



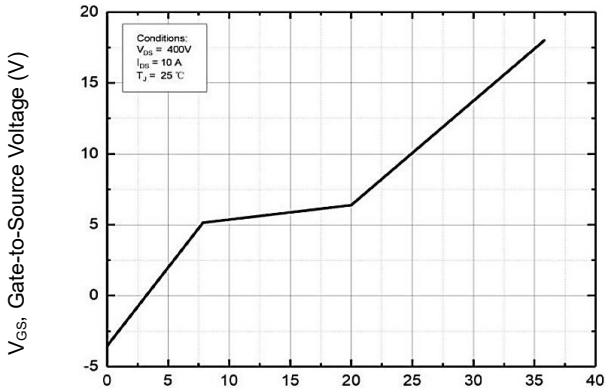
V_{DS}, Drain -to- Source Voltage (V)

Continuous Drain Current vs. Case Temperature



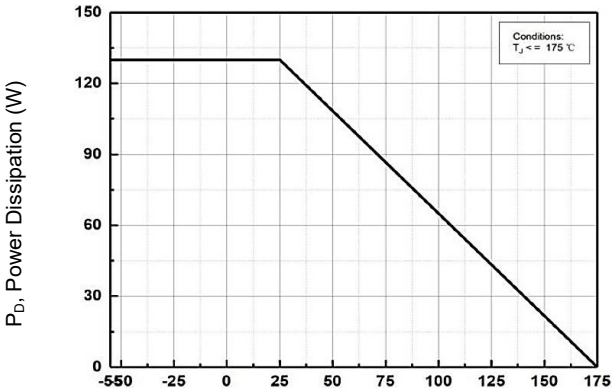
Case Temperature (°C)

Gate-Charge Characteristics



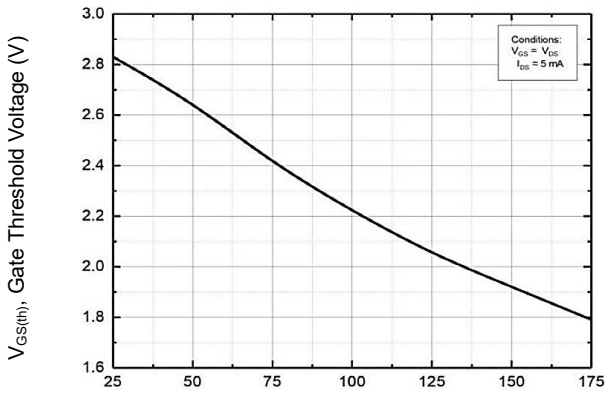
Q_g, Gate Charge (nC)

Maximum Power Dissipation Derating



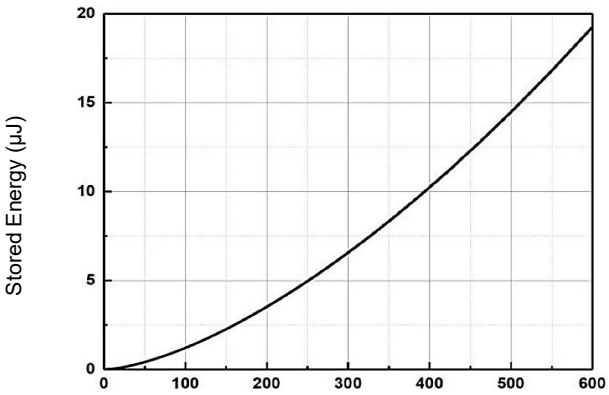
Case Temperature (°C)

Threshold Voltage vs. Junction temperature



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

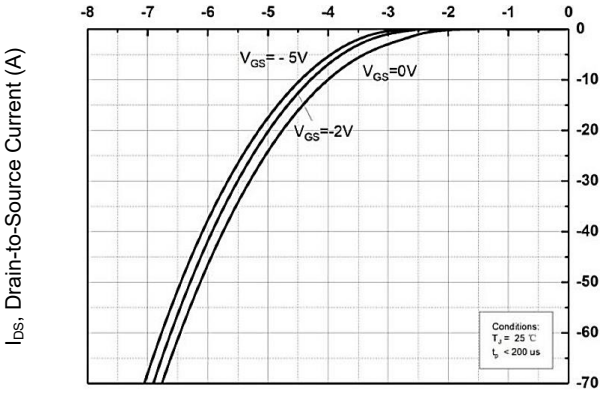
Output Capacitor Stored Energy



V_R, Reverse Voltage (V)

CHARACTERISTIC CURVES

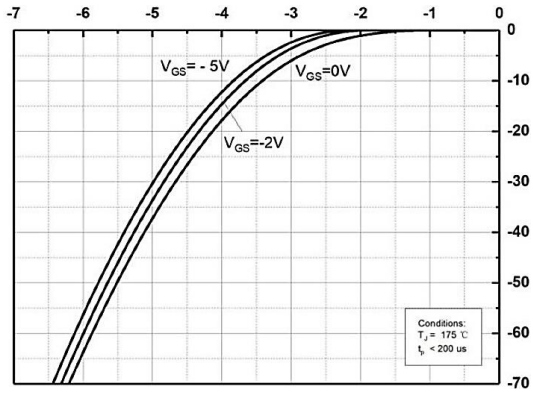
Body Diode Characteristics



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

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

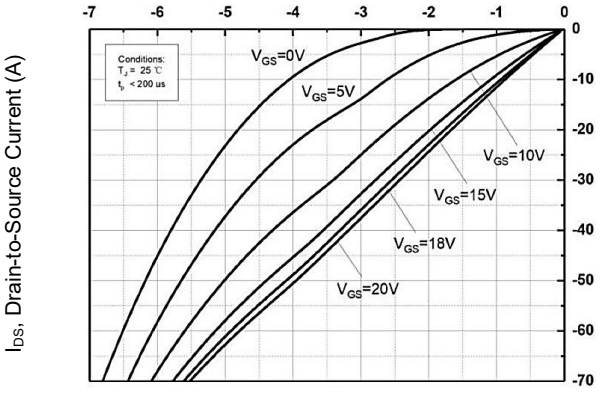
Body Diode Characteristics



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

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

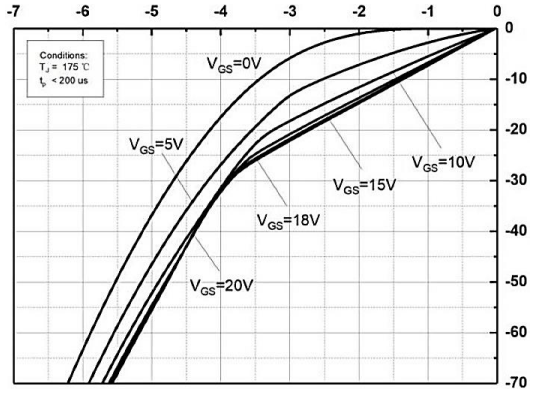
3rd Quadrant Characteristics



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

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

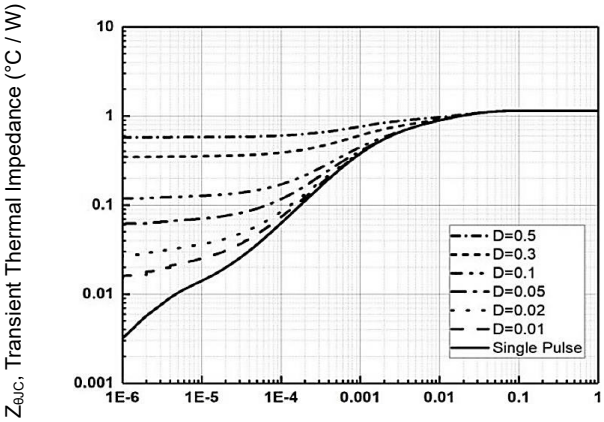
3rd Quadrant Characteristics



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

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

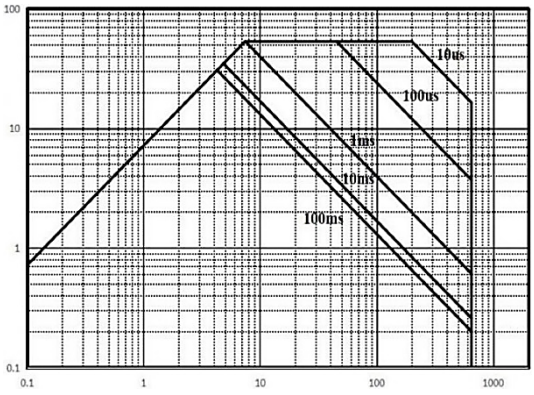
Transient Thermal Impedance



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

Pulse Width (S)

Safe Operating Area



I_D, Drain Current (A)

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