650V N-Channel Silicon Carbide Power MOSFET

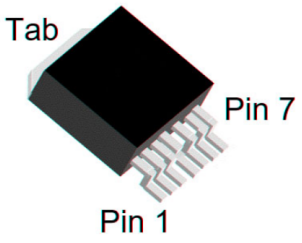
Features:

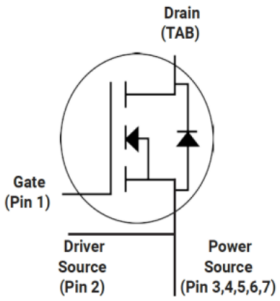
- High blocking voltage with low $R_{DS(ON)}$
- Fast switching speed with low capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

Applications:

- Switch Mode Power Supplies
- Battery charges
- High voltage DC/DC converters
- Motor Drives
- Solar inverters

Package:





Part Number	Package
DTK30N65SC7	TO-263-7L

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DS}	Drain-Source voltage	650	V	V_{GS}= 0V, I_D=100μA
V_{GS}	Gate-Source voltage	-5 to 20	V	static
V_{GS}	Gate-Source voltage	-10 to 25	V	dynamic
I_D	Drain current (continuous)	30	A	T_C=25°C
		22	A	T_C=100°C
I_{DM}	Drain current (pulsed)	65	A	
P_{TOT}	Total power dissipation	171	W	T_C=25°C
T_{stg}	Storage temperature range	-55 to 150	°C	
T_J	Operating junction temperature	-55 to 150	°C	

Thermal Data

Symbol	Parameter	Value	Unit
$R_{\theta(J-C)}$	Thermal Resistance from Junction to Case	0.73	°C/W
$R_{\theta(J-A)}$	Thermal Resistance from Junction to Case	35	°C/W

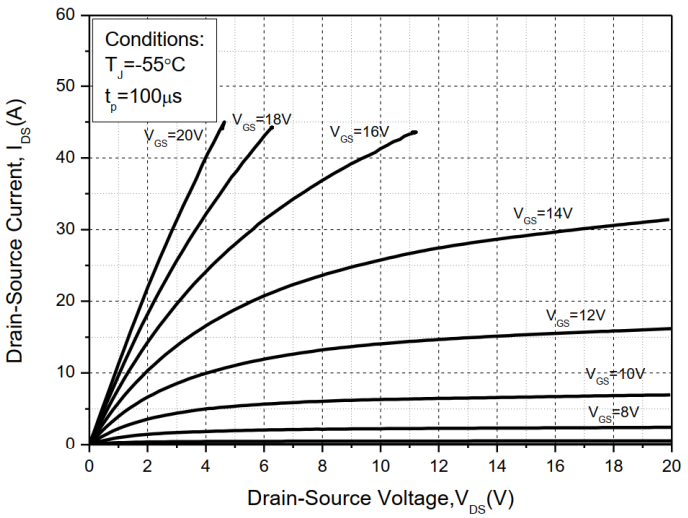
Electrical Characteristics (T_C=25°C unless otherwise specified)

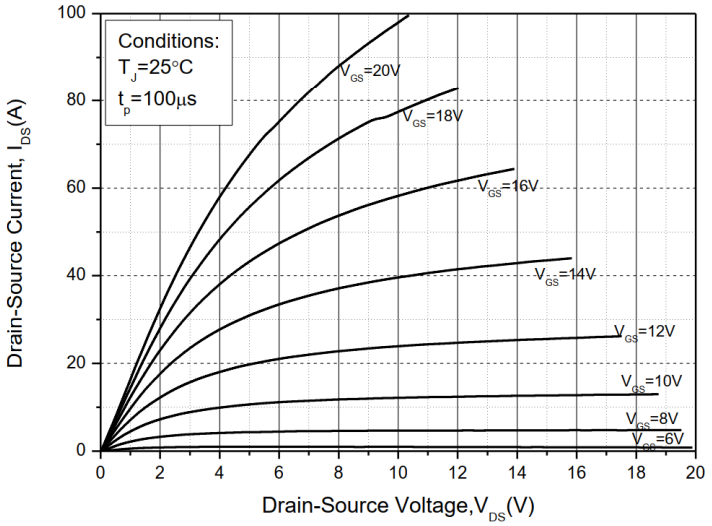
Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
I_{DSS}	Zero gate voltage drain current		2	100	μA	V_{DS}=650V, V_{GS}=0V
I_{GSS}	Gate leakage current		50	±200	nA	V_{DS}=0V, V_{GS}=20V
V_{TH}	Gate threshold voltage		2.4	4	V	V_{GS}=V_{DS}, I_D=5mA
			1.8		V	V_{GS}=V_{DS}, I_D=5mA @ T_C=150°C
R_{ON}	Static drain-source on-resistance		60	80	mΩ	V_{GS}=20V, I_D=20A @T_J=25°C
			95		mΩ	V_{GS}=20V, I_D=20A @T_J=175°C
C_{iss}	Input capacitance		1700		pF	V_{DS}=1000V, V_{GS}=0V, f=1MkHz, V_{AC}=25mV
C_{oss}	Output capacitance		172		pF	
C_{rss}	Reverse transfer capacitance		77		pF	
E_{oss}	C_{oss} stored energy		20		μJ	
Q_g	Total gate charge		65		nC	V_{DS}=400V, I_D=10A, V_{GS}=0 to 20V
Q_{gs}	Gate-source charge		18		nC	
Q_{gd}	Gate-drain charge		19		nC	
R_g	Gate input resistance		2.0		Ω	f=1MHz, V_{AC}=25mV
G_{FS}	Forward Transconductance		4.7		S	V_{DS} = 20 V, I_D = 20 A
			5.9		S	V_{DS} = 20 V, I_D = 20 A, T_J = 175 °C

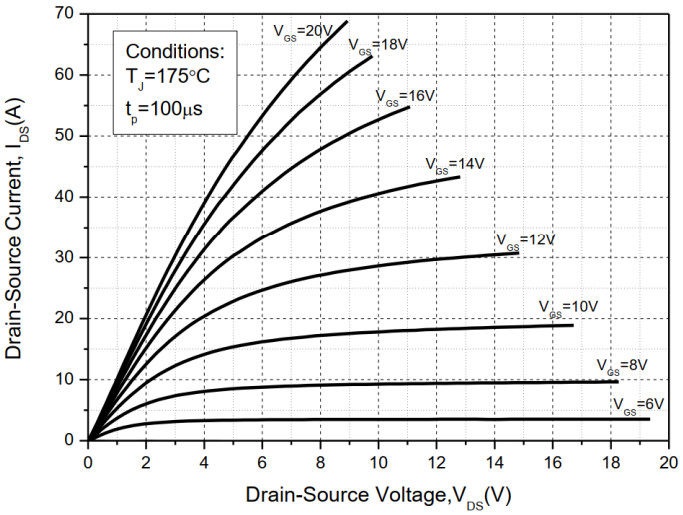
Reverse Diode Characteristics (T_C=25°C unless otherwise specified)

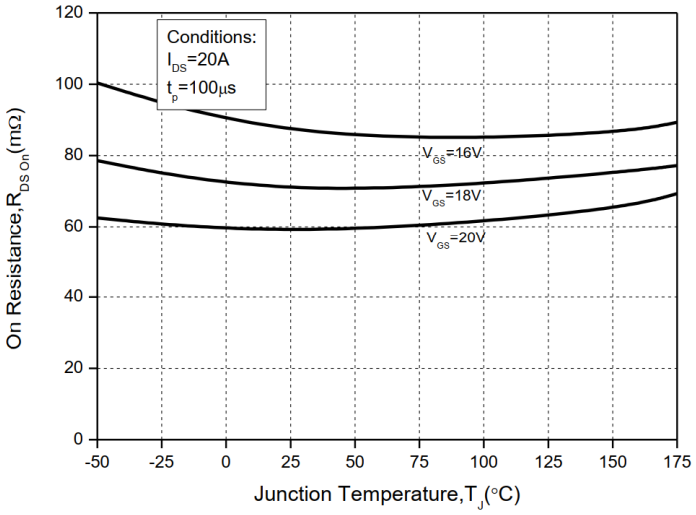
Switching Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ**	**Max**	**Units**
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 400 V , I_D = 10 A, V_{GS} = -0/+20 V, $R_{G,EXT}$ = 5 Ω R_L = 40 Ω,Timing relative to VDS		15		ns
T_R	Rise Time			45		ns
$T_{D(OFF)}$	Turn Off Delay Time			13		ns
T_F	Fall Time			10		ns
E_{ON}	Turn On Energy	V_{DD} = 400 V , I_D = 10 A, V_{GS} = -0/+20 V, $R_{G,EXT}$ = 5 Ω , L= 142 µH		140		µJ
E_{OFF}	Turn Off Energy			32		µJ
Drain-Source Diode Characteristics (T_J = 25 °C unless otherwise noted)						
I_S	Maximum Continuous Drain-Source Diode Forward Current				30	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				65	A
V_{SD}	Diode Forward Voltage	V_{GS} = -5 V , I_{SD} = 10 A		3.5		V
		V_{GS} = -5 V , I_{SD} = 10 A, T_J = 175 °C		3.3		V
I_{RM}	Peak Reverse Recovery Current	V_{GS} = -5 V , I_{SD} = 20 A, V_R = 400 V, di/dt = 1000A/µS		12		A
T_{RR}	Reverse Recovery Time			37		ns
Q_{RR}	Reverse Recovery Charge			198		nC

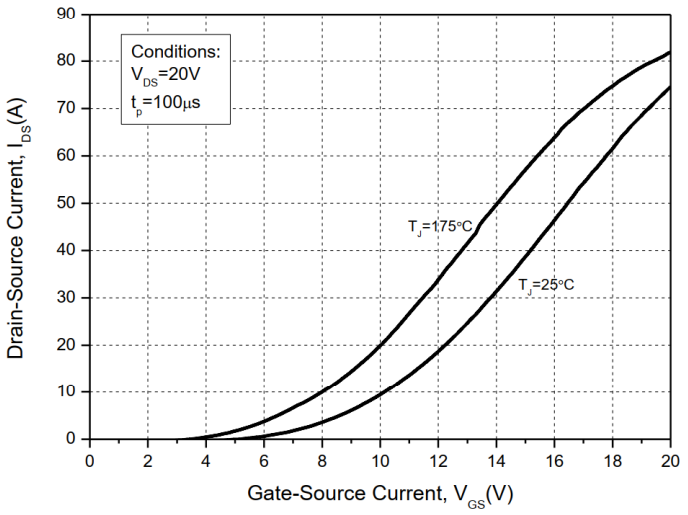
Typical Performance (curves)

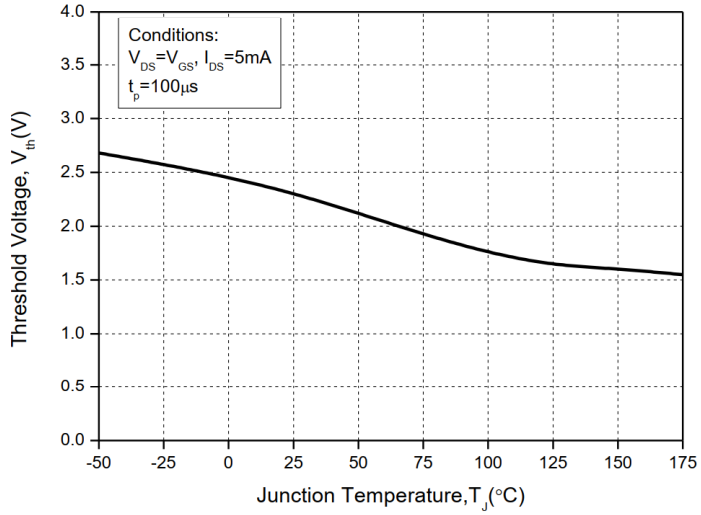












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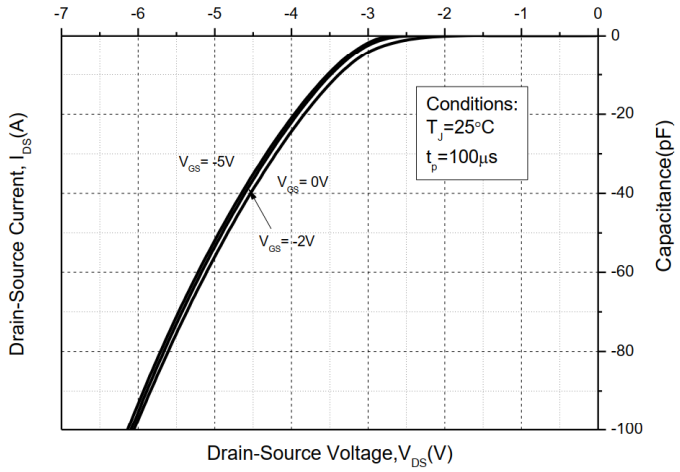

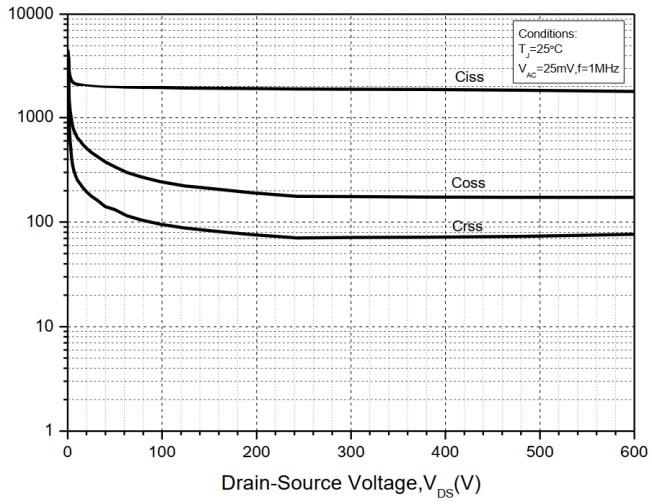

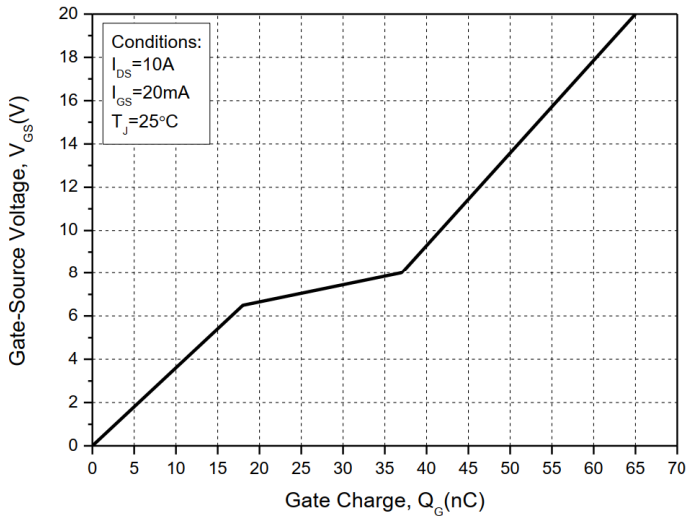

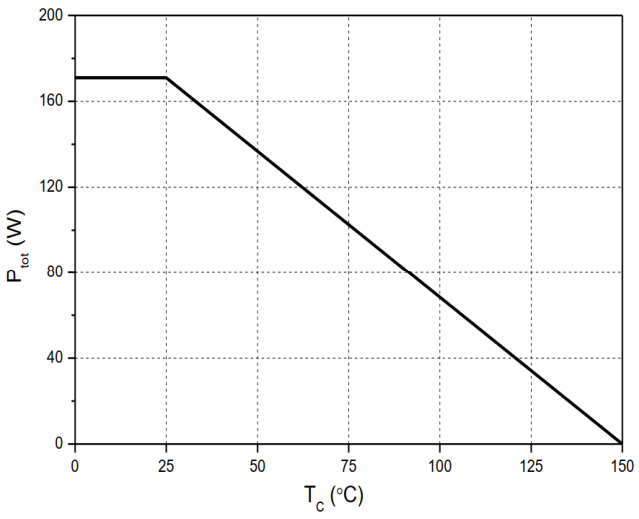

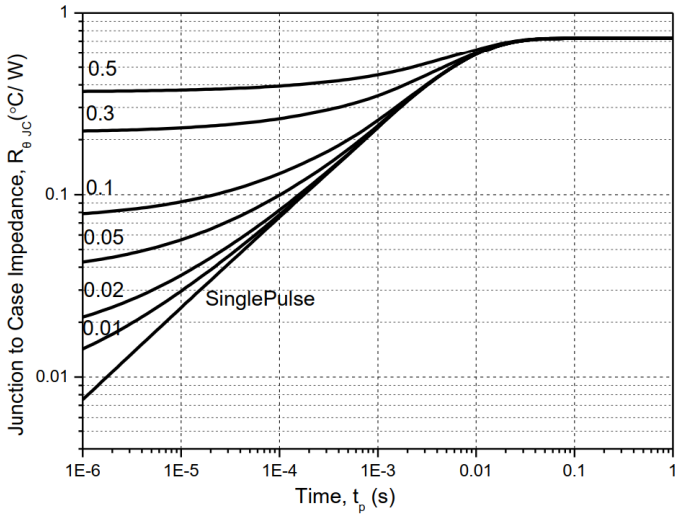

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