N-Channel Enhancement Mode

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

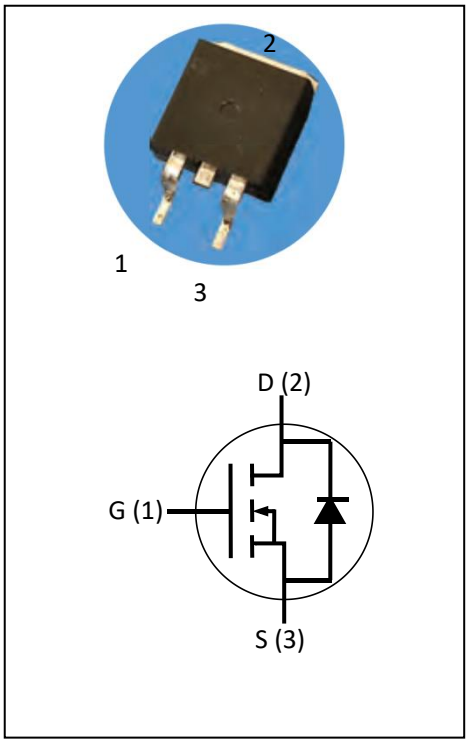
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

Package



Part Number	Package
TK3M160120E	TO-263-2

Maximum Ratings (T_c = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1200	V	V_{GS}=0V,I_D=100μA	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	17 11	A	V_{GS}=20V, T_C=25°C V_{GS}=20V, T_C=100°C	
I_{DM}	Pulse Drain Current	38	A	Pulse width limited by T_{jmax}	
P_D	Power Dissipation	127	W	T_C=25°C, T_J=150°C	Fig. 10
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	°C		

Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	V_{GS}=0V,I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	V_{GS}= V_{DS}, I_{DS}=2.5mA,T_C=25°C	Fig. 6
			1.8			V_{GS}= V_{DS}, I_{DS}=2.5mA,T_C=150°C	
I_{DSS}	Zero Gate Voltage Drain Current		1	100	μA	V_{DS}= 1200V, V_{GS}=0V	
I_{GSS}	Gate-Source Leakage Current		20	200	nA	V_{GS}=20V, V_{DS}= 0V	
$R_{DS(on)}$	Drain-Source on-state Resistance		160	192	mΩ	V_{GS}=20V, I_D=10A, T_C=25°C	Fig. 4
			285			V_{GS}=20V, I_D=10A, T_C=150°C	
g_{fs}	Transconductance		4.2		S	V_{GS} = 20 V, I_D = 10A, T_J = 25 °C	Fig. 5
			4.0			V_{GS} = 20 V, I_D = 10A,T_J = 150 °C	
Ciss	Input Capacitance		950		pF	V_{GS}=0V, V_{DS}=1000 V, f=1MHz V_{AC}=25 mV	Fig. 8
Coss	Output Capacitance		35.0				
Crss	Reverse Transfer Capacitance		8.5				
E_{ON}	Turn-OnSwitching Energy		95		μJ	V_{DS}=800V, V_{GS}=-5/20V,I_D= 10A, $R_{G(ext)}$ = 2.5Ω, L= 256μH	
E_{OFF}	Turn-Off Switching Energy		48				
$t_{d(on)}$	Turn-On Delay Time		12		ns	V_{DD}=800V, V_{GS}=-5/20 V I_D = 10A, $R_{G(ext)}$ = 2.5 Ω , R_L=80Ω , Timing relative to V_{DS}	
t_r	Rise Time		20				
$t_{d(off)}$	Turn-Off Delay Time		15				
t_f	Fall Time		10				
$R_{G(int)}$	Internal Gate Resistance		5.8		Ω	f=1 MHz, V_{AC}=25mV	
Q_{gs}	Gate to Source Charge		9		nC	V_{DD}=800V, V_{GS}=-5/20 V I_D = 10A	Fig. 9
Q_{gd}	Gate to Drain Charge		17				
Q_g	Total Gate Charge		42				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5		V	V_{GS} =-5V, I_{SD} = 5 A, T_J = 25 °C	Fig. 7
		3.3		V	V_{GS} =-5V, I_{SD} = 5 A, T_J = 150 °C	
I_S	Continuous Diode Forward Current		17	A	T_C = 25°C	
t_{rr}	Reverse Recovery time	14		ns	V_{GS} =-5V, I_{SD} = 10 A, V_R= 800V, dif/dt=1000A/μs;	
Q_{rr}	Reverse Recovery Charge	44		nC		
I_{rrm}	Peak Reverse Recovery Current	6.0		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.98	℃/W		Fig. 11
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40			

Typical Performance

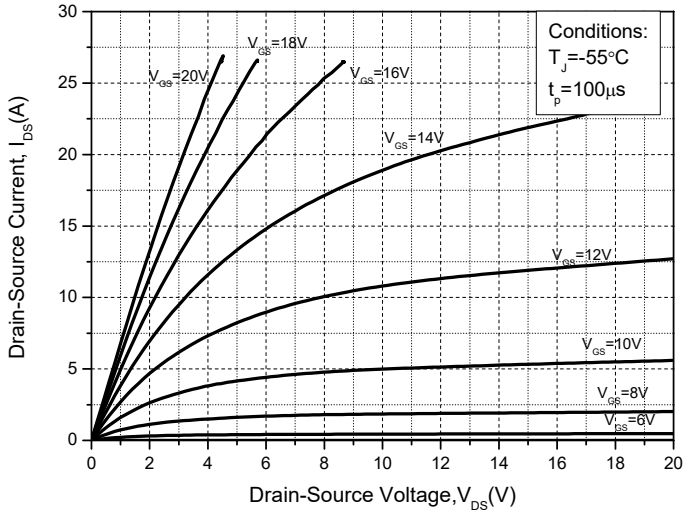


Figure 1. Output Characteristics T_J = -55 °C

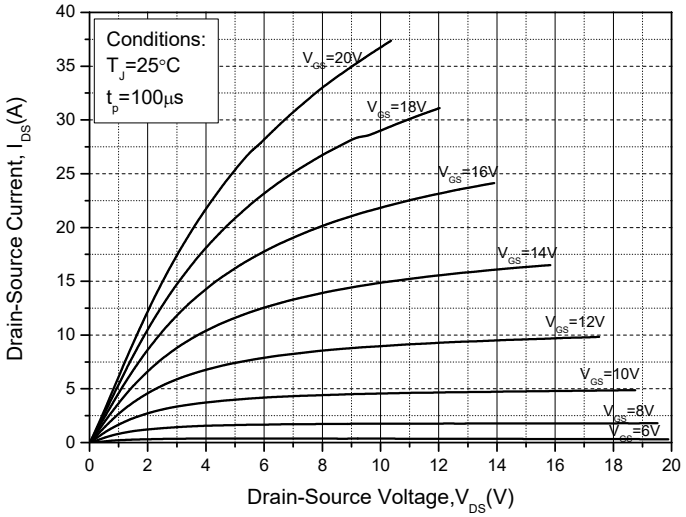


Figure 2. Output Characteristics T_J = 25 °C

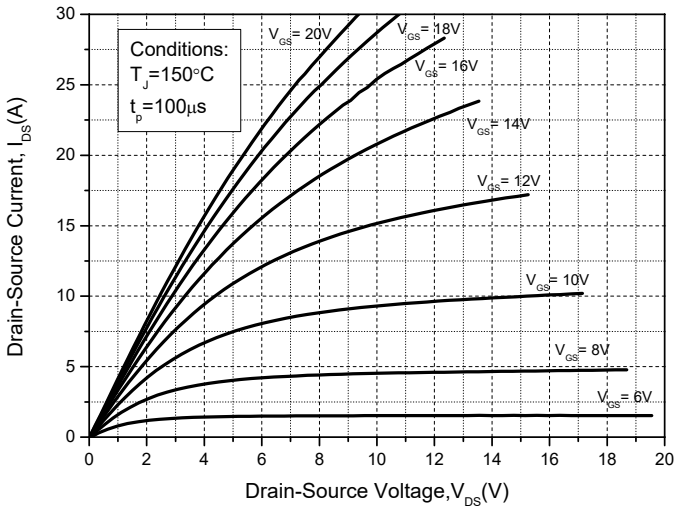


Figure 3. Output Characteristics T_J =150°C

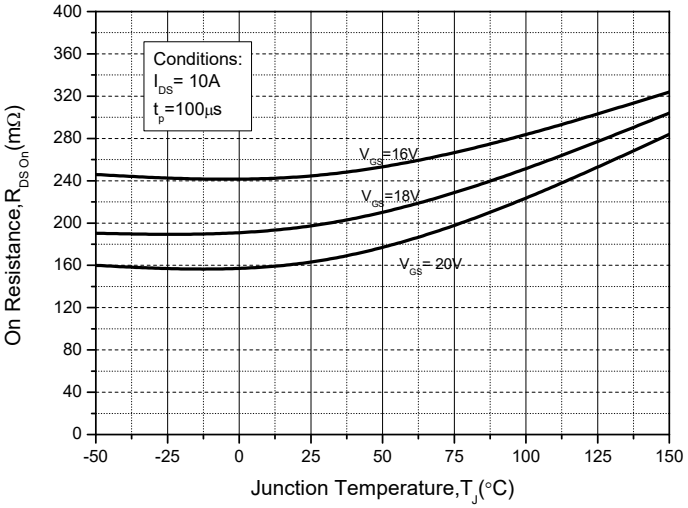


Figure 4. On-Resistance For Various Gate Voltage

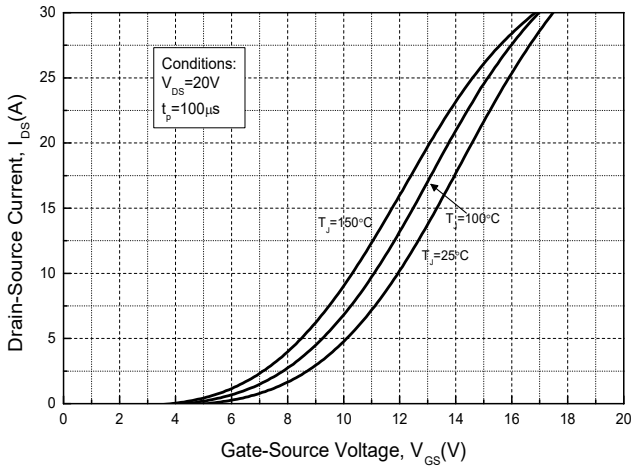


Figure 5. Transfer Characteristic

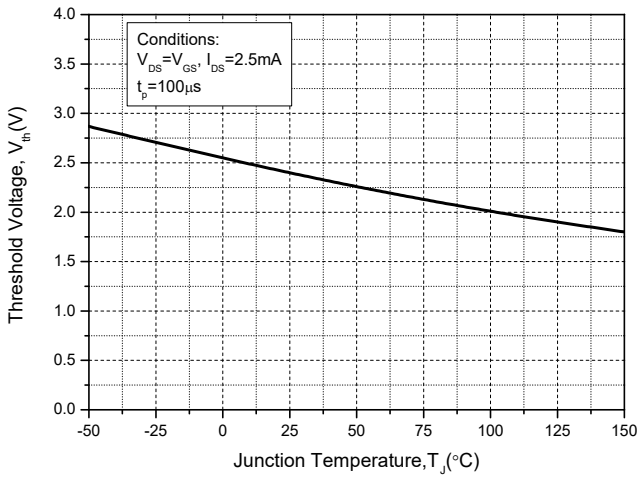


Figure 6. Threshold Voltage vs. TemperatureforVarious Junction Temperatures

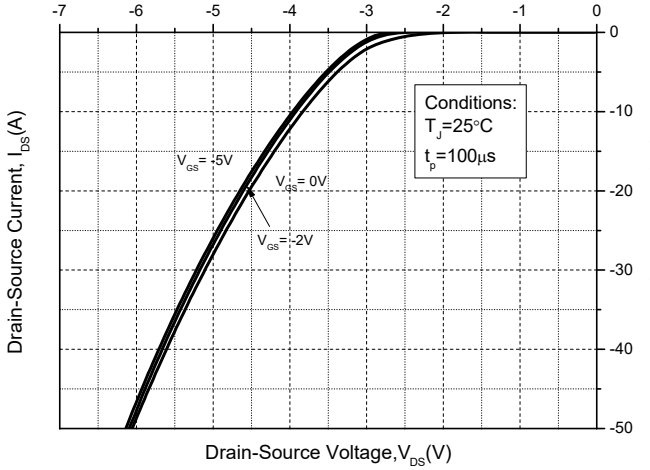


Figure 7.Body Diode Characteristics

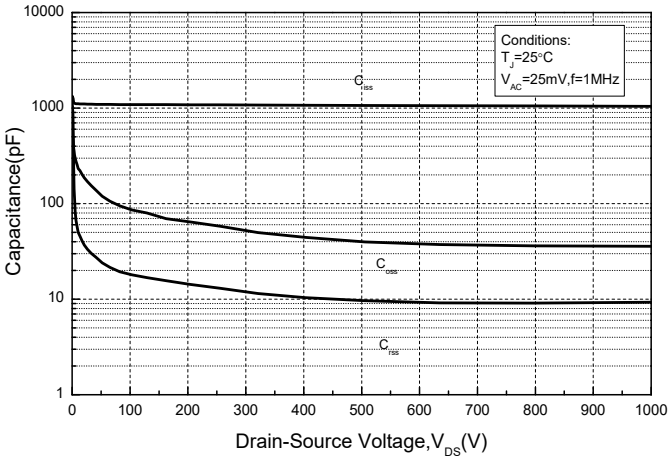


Figure 8. Capacitances vs. Drain-Source Voltage

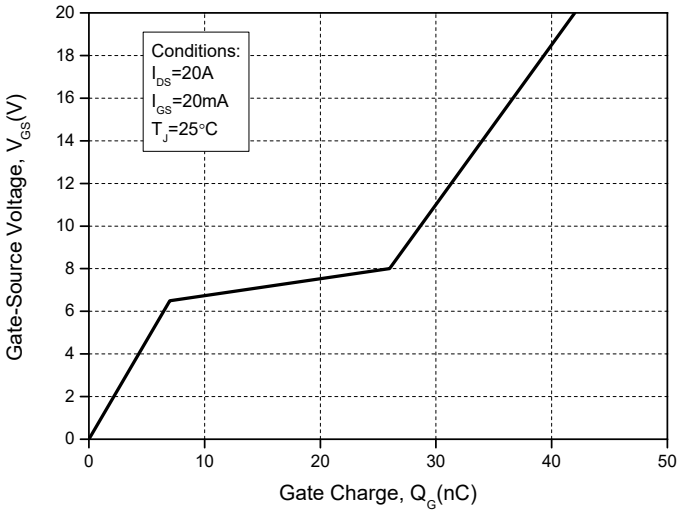


Figure 9. Gate Charge Characteristics

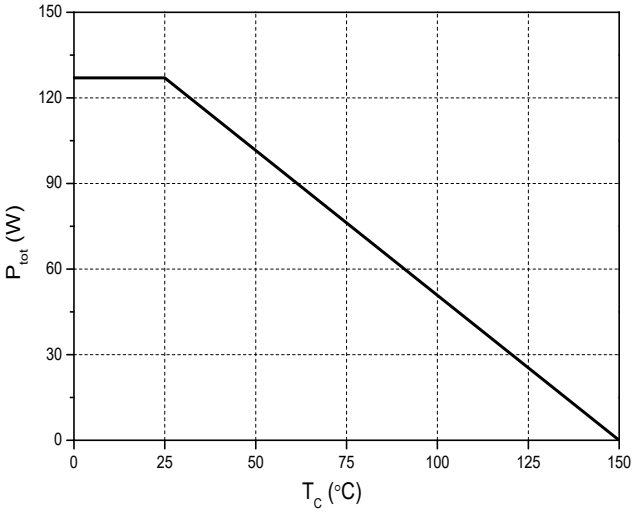


Figure 10. Power Dissipation Derating

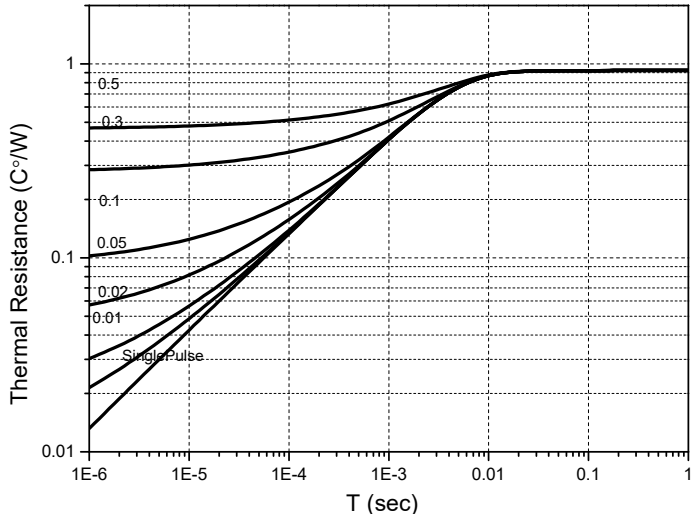
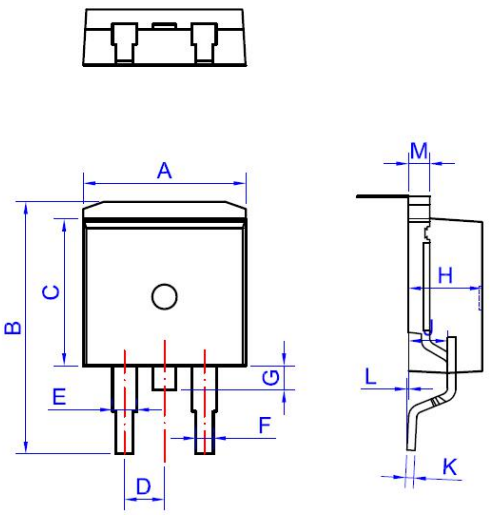


Figure 11. Transient Thermal Impendance

Package Dimensions: TO-263-2L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.90		10.20	0.390		0.402
B	14.70		15.80	0.579		0.622
C	9.4		9.6	0.37		0.378
D		2.54			0.100	
E	1.20		1.40	0.047		0.055
F	0.75		0.85	0.029		0.033
G			1.75			0.069
H	4.40		4.70	0.173		0.185
J	2.30		2.70	0.091		0.106
K	0.38		0.55	0.015		0.022
L	0	0.10	0.25	0	0.004	0.010
M	1.25		1.35	0.049		0.053