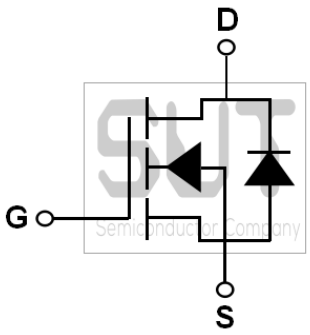
Version 1.0 Date 2019.03.27 Datasheet

N-Channel 40-$V_{(D-S)}$ MOSFET

PRODUCT SUMMARY		
B_{VDSS}(V)	$R_{DS(on)}$ (mΩ)(MAX)	I_D(A)
40	2.5@V_{GS}=10V	160

TO220 Pin Configuration



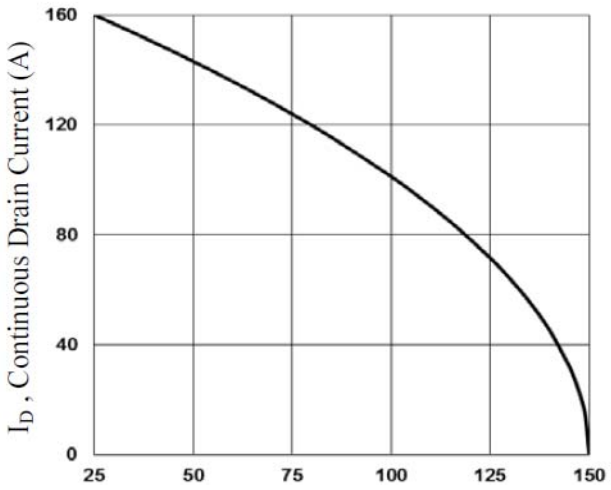
ABSOLUTE MAXIMUM RATINGS(T_C=25℃ UNLESS OTHERWISE NOTED)			
Parameter	**Symbol**	**Rating**	**Units**
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)(Chip Limitation)	I_D	160	A
Drain Current-Continuous (T_C=100℃)(Chip Limitation)		100	A
Drain Current-Pulsed[1]	I_{DM}	640	A
Single Pulse Avalanche Energy[2]	EAS	360	mJ
Single Pulse Avalanche Current[2]	IAS	85	A
Power Dissipation (T_C=25℃)	P_D	184	W
Power Dissipation-Derate above 25℃		1.47	W/℃
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

THERMAL CHARACTERISTICS				
Parameter	**Symbol**	**Typ.**	**Max.**	**Unit**
Thermal Resistance Junction to ambient	$R_{\theta JA}$	---	62	℃/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	0.68	℃/W

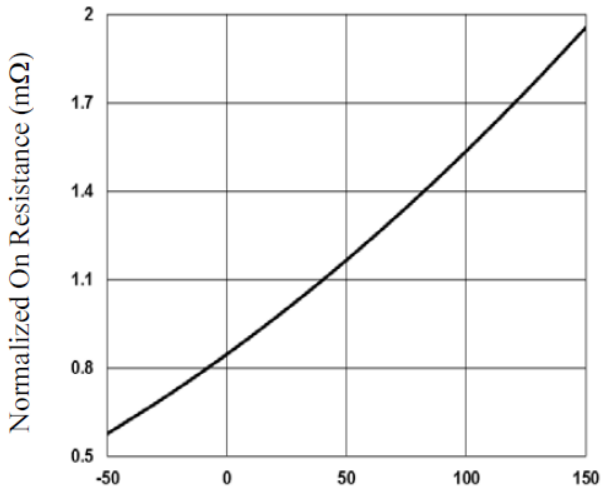
ELECTRICAL CHARACTERISTICS (T_J=25℃ UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
Static State Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V , I_D=250uA	40	---	---	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V,V_{DS}=40V, T_J=25℃	---	---	1	uA
		V_{GS}=0V,V_{DS}=32V, T_J=85℃	---	---	10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Static Drain-Source On-Resistance[3]	$R_{DS(ON)}$	V_{GS}=10V , I_D=30A	---	2.1	2.5	mΩ
		V_{GS}=4.5V , I_D=15A	---	2.6	3.5	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	1.0	1.6	2.5	V
Forward Transconductance	gfs	V_{DS}=10V , I_D=15A	---	45	---	S
Dynamic and Switching Characteristics						
Total Gate Charge[3 , 4]	Q_g	V_{GS}=4.5V , V_{DS}=20V , I_D=10A	---	70	140	nC
Gate-Source Charge[3 , 4]	Q_{gs}		---	15	32	
Gate-Drain Charge[3 , 4]	Q_{gd}		---	40	80	
Turn-On Delay Time[3 , 4]	$T_{d(on)}$	V_{GS}=10V , V_{DD}=20V , R_G=10Ω , I_D=10A	---	24.6	48	ns
Rise Time[3 , 4]	T_r		---	62.8	120	
Turn-Off Delay Time[3 , 4]	$T_{d(off)}$		---	224	440	
Fall Time[3 , 4]	T_f		---	162	320	
Input Capacitance	C_{iss}	V_{GS}=0V , V_{DS}=25V , F=1MHz	---	8000	12000	pF
Output Capacitance	C_{oss}		---	550	1000	
Reverse Transfer Capacitance	C_{rss}		---	420	800	
Gate resistance	R_g	V_{GS}=0V,V_{DS}=0V,F=1MHz	---	1.2	2.4	Ω
Guaranteed Avalanche Characteristics						
Single Pulse Avalanche Energy	EAS	V_{DD}=25V,L=0.1mH,IAS=30A	45	---	---	mJ
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V,Force Current	---	---	160	A
Pulsed Source Current[3]	I_{SM}		---	---	320	A
Diode Forward Voltage[3]	V_{SD}	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.0	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V , I_S=20A , dI/dt=100A/μs , T_J=25℃	---	32	---	ns
Reverse Recovery Charge	Q_{rr}		---	19	---	nC

Note :

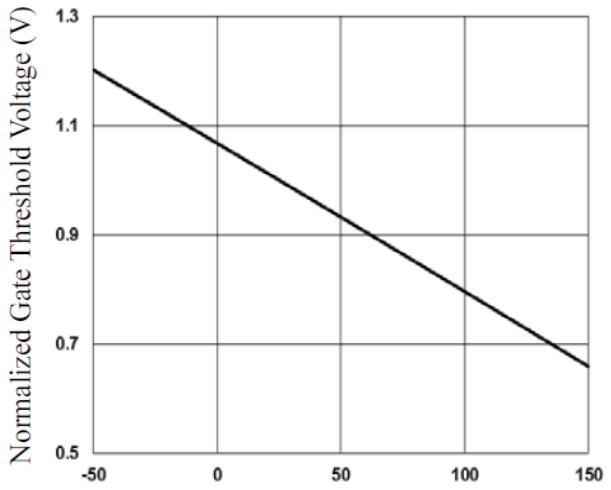
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{GS}=10V , V_{DD}=25V , L=0.1mH , I_{AS}=85A , R_G=25Ω , Starting T_J=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.



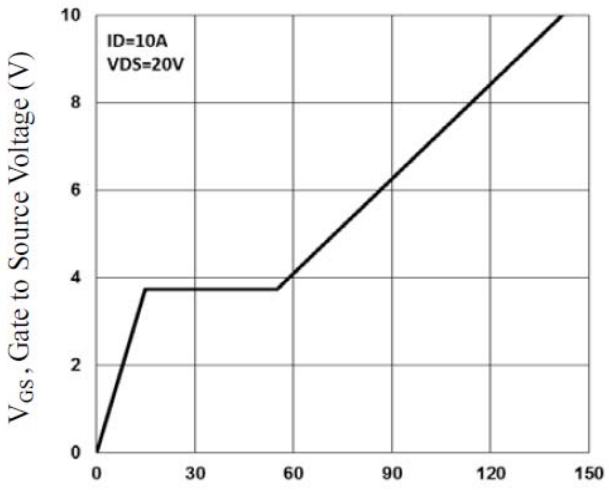
Continuous Drain Current vs. T_C



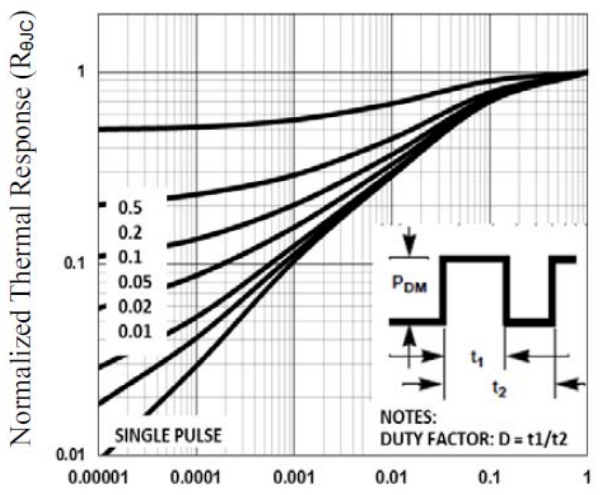
Normalized $R_{DS(ON)}$ vs. T_J



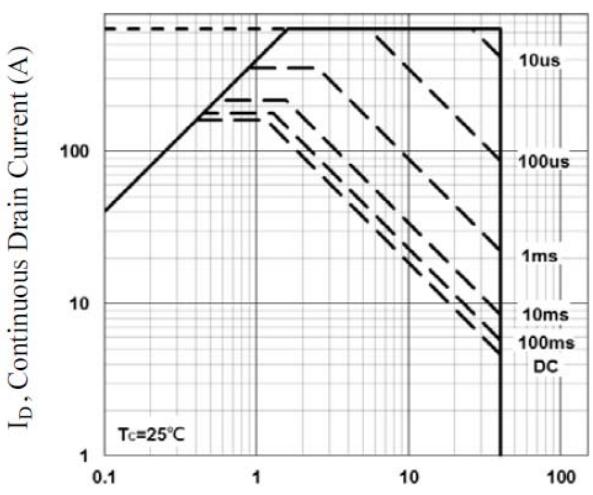
Normalized V_{th} vs. T_J



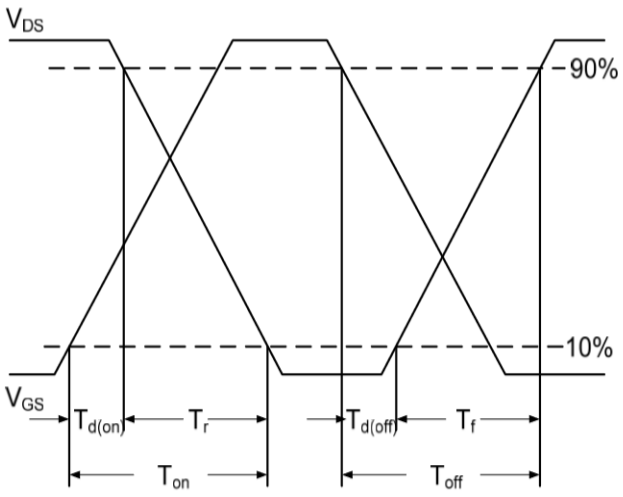
Gate Charge Waveform



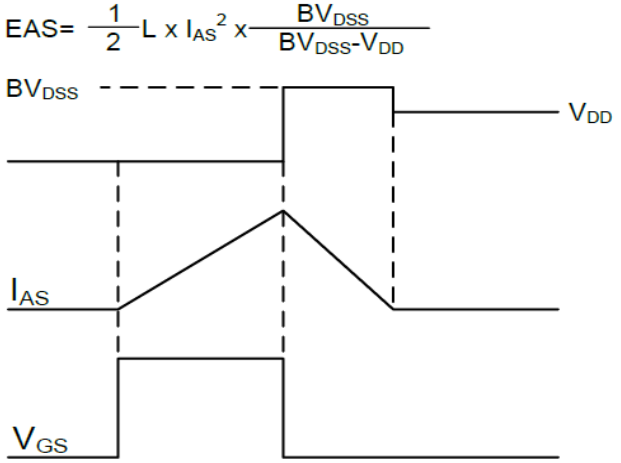
Normalized Transient Impedance



Maximum Safe Operation Area

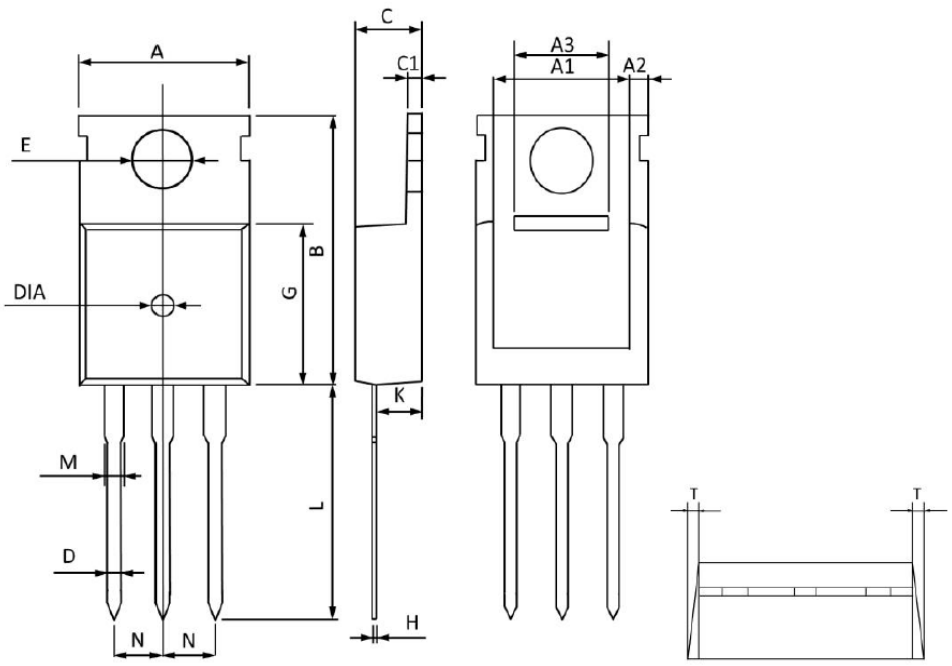


Switching Time Waveform



EAS Waveform

TO220 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.350		W0.014	
DIA	Ø1.500(TYP)	Deep0.200(TYP)	Ø0.059(TYP)	Deep0.008(TYP)