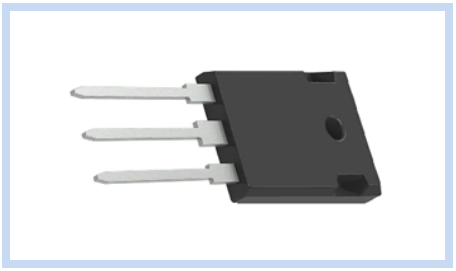
Silicon Carbide MOSFET
N-Channel 1200V 68A TO-247

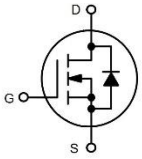
MFTC120N68T247

MERITEK

FEATURE



- $R_{DS(ON)}$<48mΩ at V_{GS}=18V, I_D=40A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery
- Applications: High Voltage DC/DC Converters, Switching Mode Power Supplier, Renewable Energy, Motor Drives



RoHS

MECHANICAL DATA

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

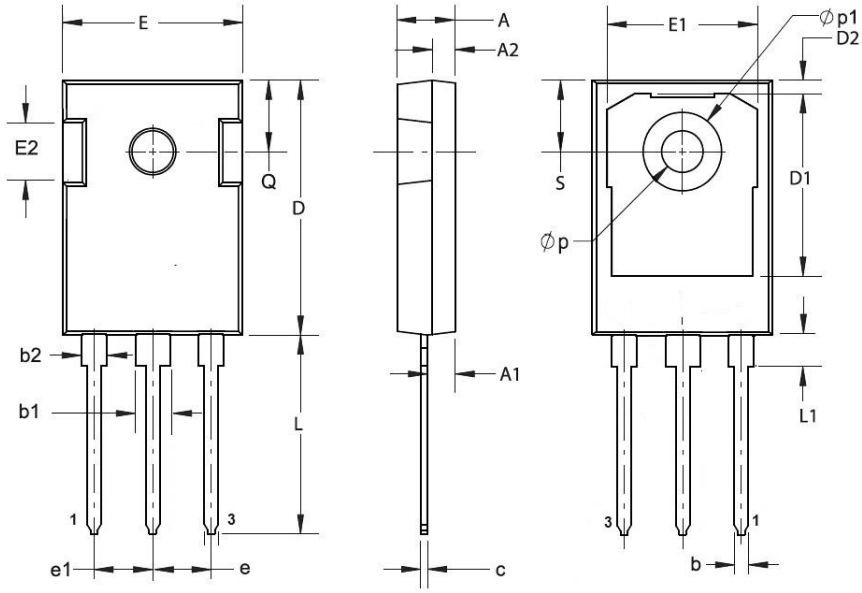
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	1200	V
Gate-Source Voltage	Dynamic (f >1Hz)	V_{GS}	-10/+25	V
	Static		-4/+18	
Drain Current – Continuous	V_{GS} =18V, T_C=25°C	I_D	68	A
	V_{GS} =18V, T_C=100°C		48	
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	133	A
	at 100μs		319	
Power Dissipation		P_D	340	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.44	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

DIMENSION	Min	Max
A	4.80	5.20
A1	2.21	2.59
A2	1.85	2.15
b	1.11	1.36
b1	2.91	3.21
b2	1.91	2.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
e	5.44 BSC	
e1	5.44 BSC	
E	15.50	16.10
L	19.62	20.22
L1	--	4.30
p	3.40	3.80
p1	--	7.30
Q	6.15 BSC	

Note: Pin Layout: 1:Gate(G), 2:Drain(D), 3:Source(S)

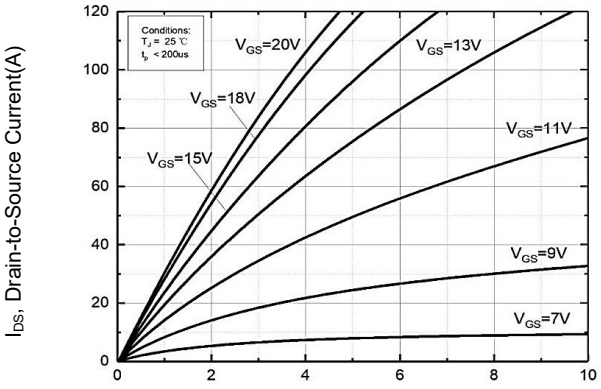


ELECTRICAL CHARACTERISTICS

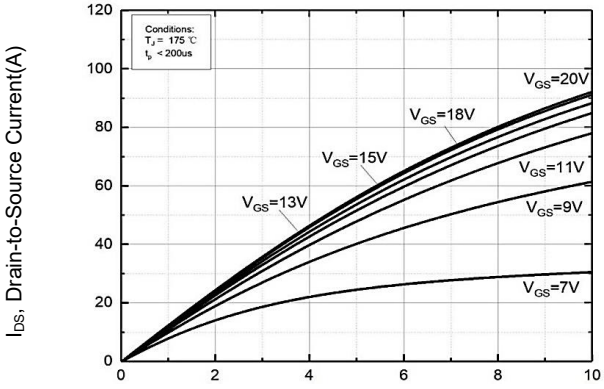
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100μA	BV_{DSS}	1200	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=1200V, V_{GS}=0V	I_{DSS}	--	1	50	μA
Gate-Body Leakage Current	V_{GS}=18V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=18V, I_D=40A	$R_{DS(ON)}$	--	35	48	mΩ
	V_{GS}=20V, I_D=40A		--	32	--	
	V_{GS}=18V, I_D=40A, T_J=175°C		--	60	--	
	V_{GS}=20V, I_D=40A, T_J=175°C		--	55	--	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=9.5mA	$V_{GS(th)}$	1.8	2.9	3.6	V
	V_{GS}=V_{DS}, I_D=9.5mA, T_J=175°C		--	2.0	--	
Transconductance	V_{GS}=18V, I_D=40A	g_{FS}	--	25	--	S
	V_{GS}=18V, I_D=40A, T_J=175°C		--	21	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=800V, I_D=40A, V_{GS}= -4/+18V	Q_g	--	103	--	nC
Gate-Source Charge		Q_{gs}	--	22.6	--	
Gate-Drain Charge		Q_{gd}	--	31.2	--	
Turn-On Delay Time	V_{DS}=800V, I_D=40A, L=276μH V_{GS}= -4/+18V, R_{GEN}=5Ω	$T_{d(on)}$	--	5	--	nS
Rise Time		T_r	--	33.6	--	
Turn-Off Delay Time		$T_{d(off)}$	--	27.8	--	
Fall Time		T_f	--	13	--	
Turn-On Switching Loss		E_{ON}	--	578	--	μJ
Turn-Off Switching Loss		E_{OFF}	--	294	--	
Totel Switching Loss		E_{TOT}	--	872	--	
Input Capacitance	V_{DS}=1000V, V_{GS}=0V, V_{AC}=25mV f=1MHz	C_{iss}	--	2820	--	pF
Output Capacitance		C_{oss}	--	108	--	
Reverse Transfer Capacitance		C_{rss}	--	6.6	--	
Internal Gate Resistance	V_{AC}=25mV, f=1MHz	$R_{G(int)}$	--	1	--	Ω
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Forward Current	V_{GS}= -4V, T_C=25°C	I_S	--	72	--	A
Diode Forward Current - Pulse with tp Limited by Tjmax	V_{GS}= -4V	$I_{S,Pulse}$	--	133	--	A
Drain-Source Diode Forward Voltage	V_{GS}= -4V, I_{SD}=20A	V_{SD}	--	3.9	--	V
	V_{GS}= -4V, I_{SD}=20A, T_J=175°C		--	3.3	--	
Peak Reverse Recovery Current	V_{GS}= -4V, V_R=800V, I_{SD}=40A, dif/dt=3800A/μs	I_{rm}	--	18	--	A
Reverse Recovery Time		T_{rr}	--	31	--	nS
Reverse Recovery Charge		Q_{rr}	--	281	--	nC

CHARACTERISTIC CURVES

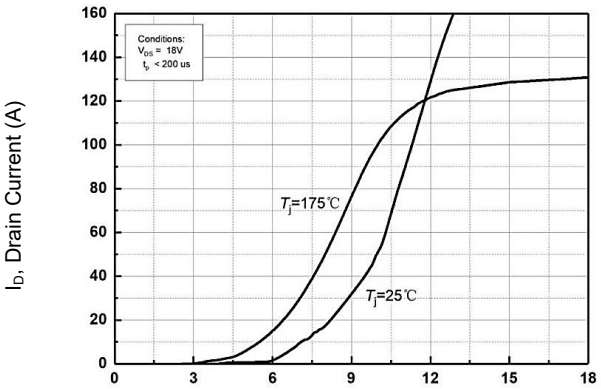
Output Characteristics



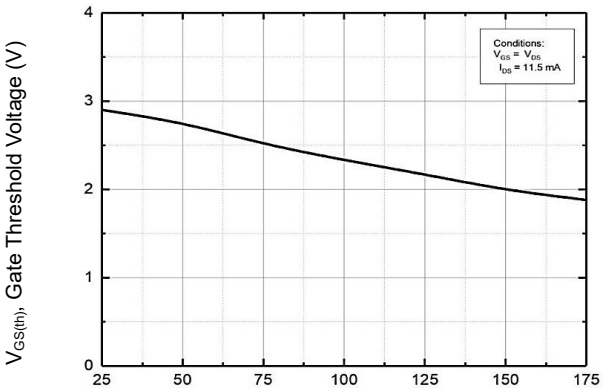
Output Characteristics



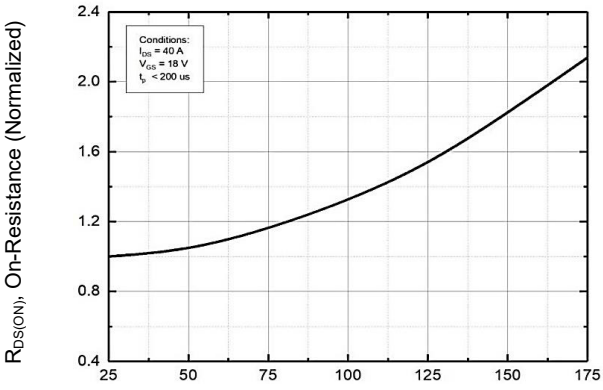
Transfer Characteristic



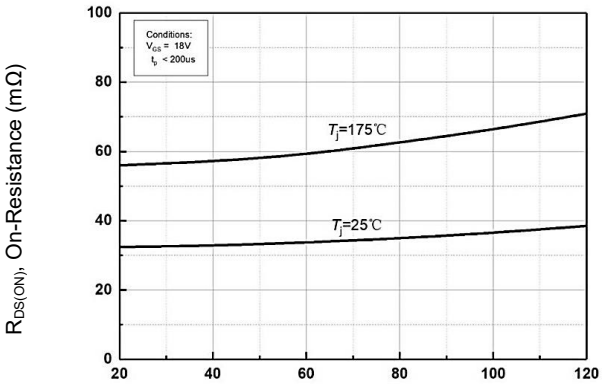
Threshold Voltage vs. Junction temperature



Normalized On-Resistance vs. Junction temperature

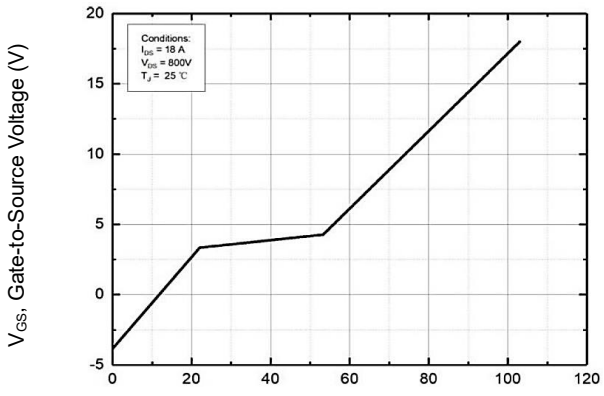


On-Resistance vs. Drain Current

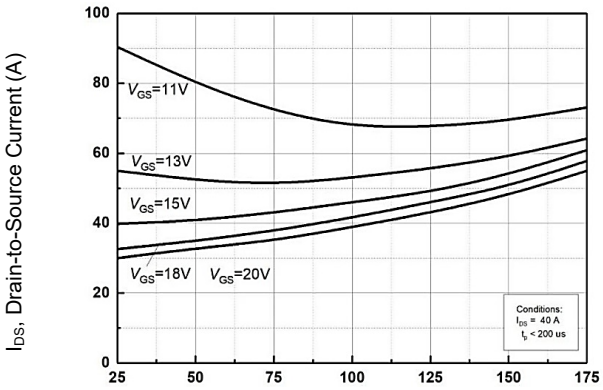


CHARACTERISTIC CURVES

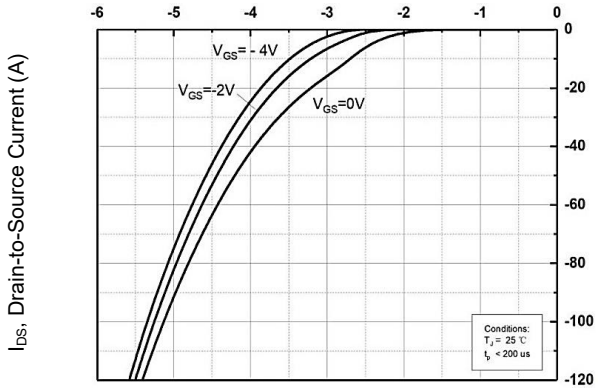
Gate-Charge Characteristics



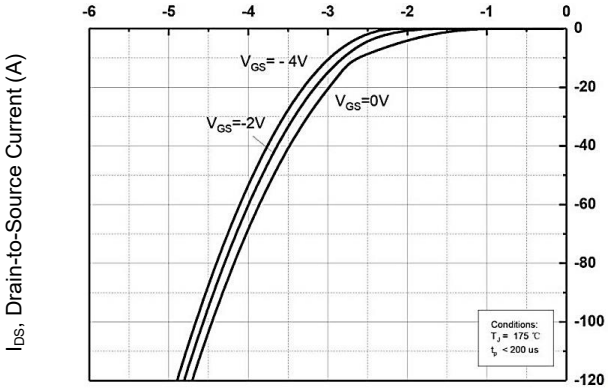
On-Resistance vs. Junction temperature for V_{GS}



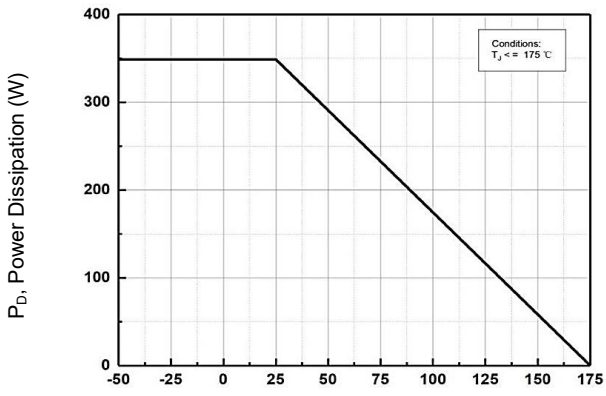
Body Diode Characteristics



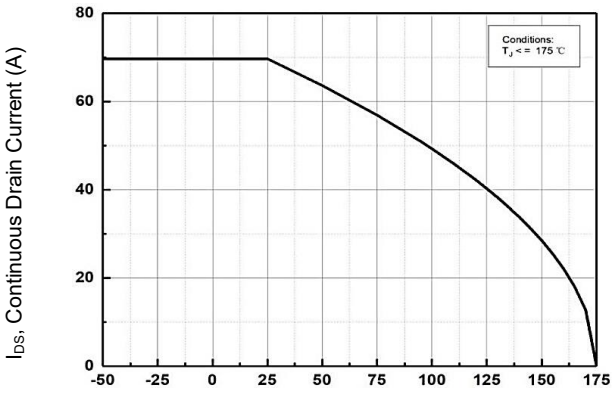
Body Diode Characteristics



Maximum Power Dissipation Derating

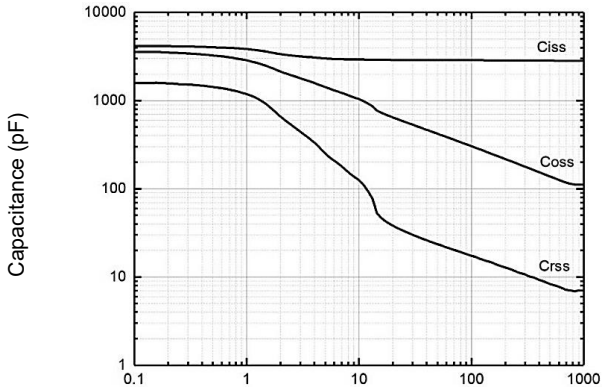


Continuous Drain Current vs. Case Temperature

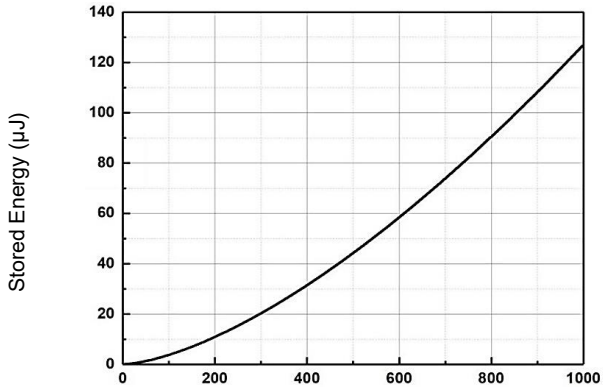


CHARACTERISTIC CURVES

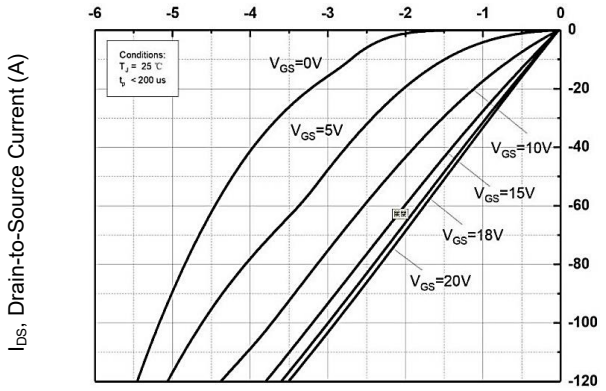
Capacitance vs. Drain-Source Voltage



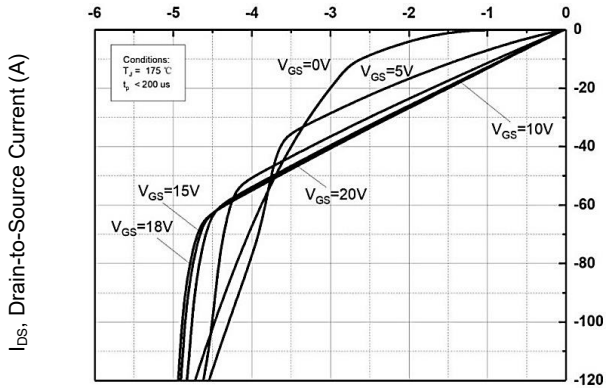
Output Capacitor Stored Energy



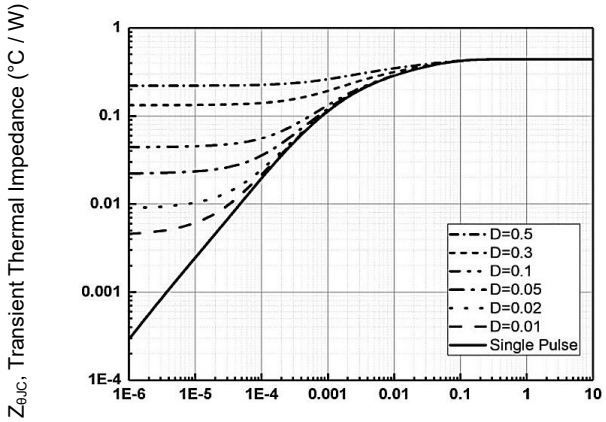
3rd Quadrant Characteristics



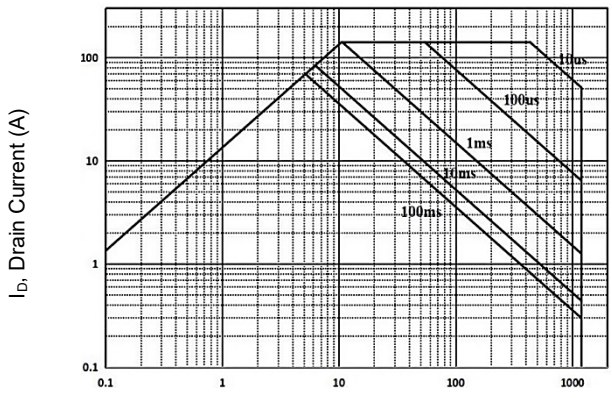
3rd Quadrant Characteristics



Transient Thermal Impedance

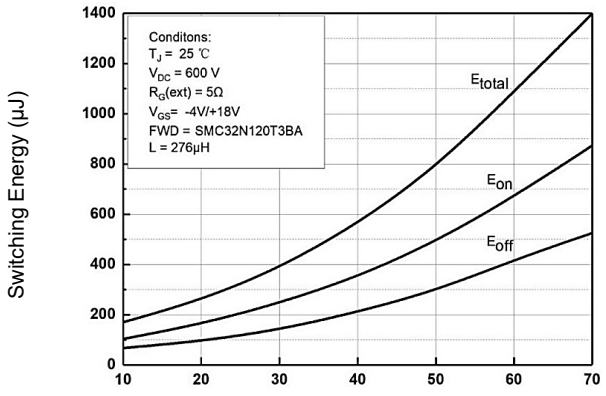


Safe Operating Area



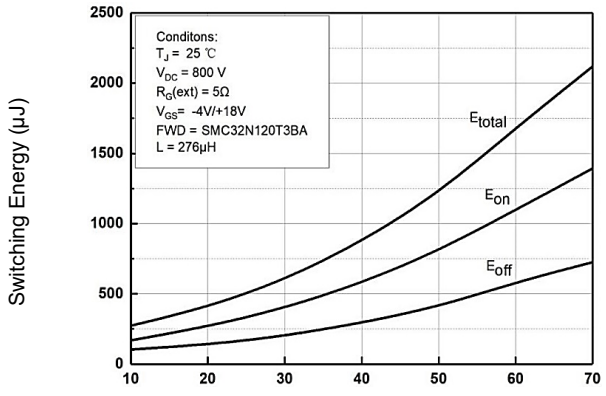
CHARACTERISTIC CURVES

Clamped Inductive Switching Energy vs Drain current at 600V



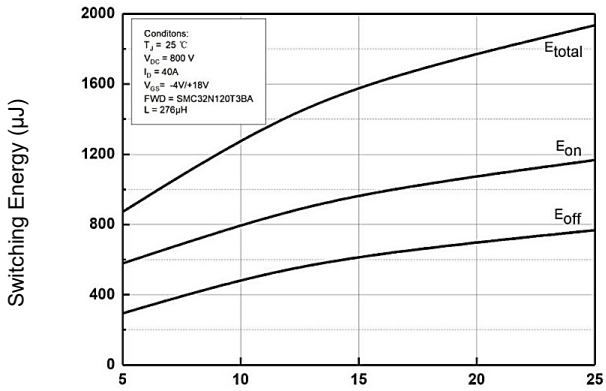
I_{DS}, Drain-to-Source Current (A)

Clamped Inductive Switching Energy vs Drain current at 800V



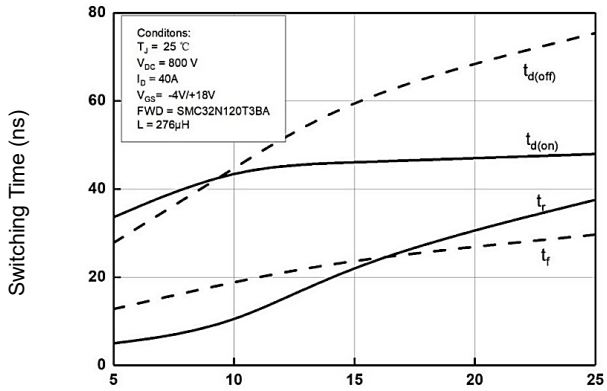
I_{DS}, Drain-to-Source Current (A)

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)