

Silicon Carbide MOSFET

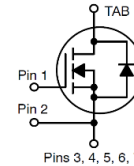
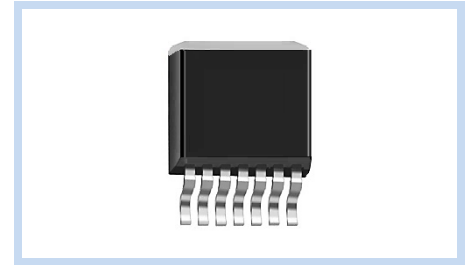
N-Channel 1200V 34A TO-263-7

MFTC120N34T2637

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FEATURE

- $R_{DS(ON)} < 100m\Omega$ at $V_{GS}=18V, I_D=20A$
- 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, Motor Drives



MECHANICAL DATA

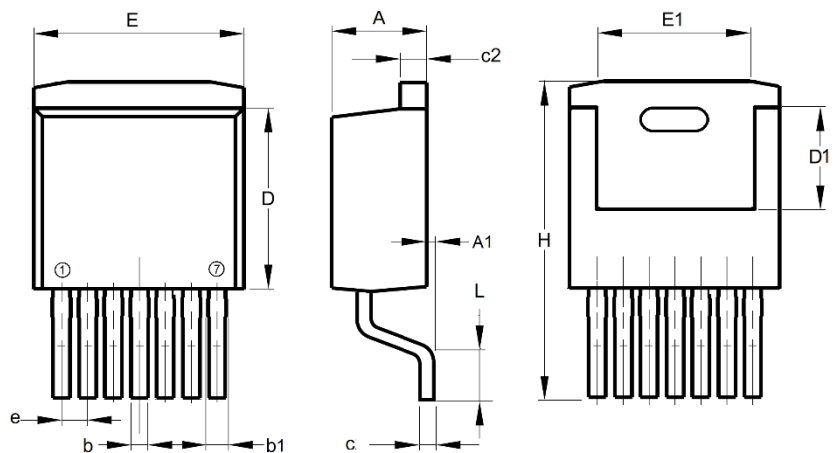
- Case: TO-263-7 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	$V_{GS}=0V, I_D=100\mu A$	V_{DS}	1200	V
Gate-Source Voltage	Dynamic ($f > 1Hz$)	V_{GS}	-10/+25	V
	Static		-5/+20	
Continuous Drain Current	$V_{GS}=20V, T_C=25^\circ C$	I_D	34	A
	$V_{GS}=20V, T_C=100^\circ C$		22	
Drain Current – Pulse with t_p Limited by T_{jmax}	at 1ms	I_{DM}	70	A
	at 100 μs		170	
Power Dissipation	$T_C=25^\circ C$	P_D	242	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.62	$^\circ C / W$
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	$^\circ C$

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	16.0
L	1.90	2.75



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

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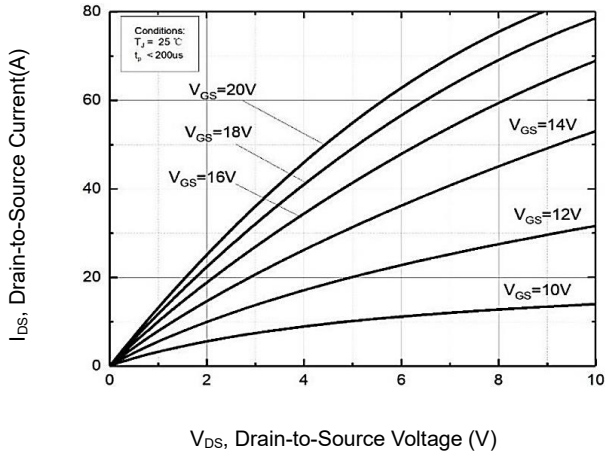
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ELECTRICAL CHARACTERISTICS

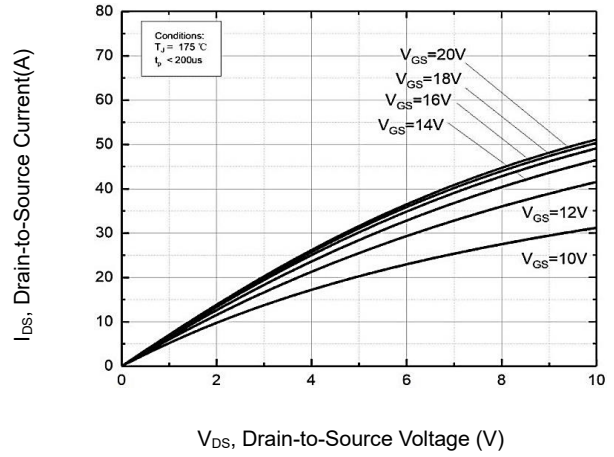
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit	
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	BV_{DSS}	1200	--	--	V	
Zero Gate Voltage Drain Current	$V_{DS}=1200V, V_{GS}=0V$	I_{DSS}	--	1	50	μA	
Gate-Body Leakage Current	$V_{GS}=20V, V_{DS}=0V$	I_{GSS}	--	--	250	nA	
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit	
Static Drain-Source On-Resistance	$V_{GS}=18V, I_D=20A$	$R_{DS(ON)}$	--	75	100	m Ω	
	$V_{GS}=20V, I_D=20A$		--	68	98		
	$V_{GS}=18V, I_D=20A, T_J=175^\circ C$		--	135	--		
	$V_{GS}=20V, I_D=20A, T_J=175^\circ C$		--	130	--		
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=5mA$	$V_{GS(th)}$	--	3.0	--	V	
	$V_{GS}=V_{DS}, I_D=5mA, T_J=175^\circ C$		--	2.3	--		
Transconductance	$V_{GS}=20V, I_D=20A$	g_{fs}	--	9	--	S	
	$V_{GS}=20V, I_D=20A, T_J=175^\circ C$		--	7	--		
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit	
Total Gate Charge	$V_{DS}=800V, I_D=30A, V_{GS}= -5/+20V$	Q_g	--	44.8	--	nC	
Gate-Source Charge		Q_{gs}	--	14	--		
Gate-Drain Charge		Q_{gd}	--	19	--		
Turn-On Delay Time	$V_{DS}=800V, I_D=20A, L=276\mu H$ $V_{GS}= -4/+20V, R_{GEN}=5\Omega,$	$T_{d(on)}$	--	8.2	--	nS	
Rise Time		T_r	--	10.8	--		
Turn-Off Delay Time		$T_{d(off)}$	--	16.7	--		
Fall Time		T_f	--	10.5	--		
Turn-On Switching Loss		E_{ON}	--	154.9	--	μJ	
Turn-Off Switching Loss		E_{OFF}	--	84.5	--		
Total Switching Loss		E_{TOT}	--	218	--		
Input Capacitance		$V_{DS}=1000V, V_{GS}=0V, V_{AC}=25mV$ $f=1MHz$	C_{iss}	--	1374	--	pF
Output Capacitance			C_{oss}	--	63	--	
Reverse Transfer Capacitance			C_{rss}	--	3.5	--	
Internal Gate Resistance	$V_{AC}=25mV, f=1MHz$	$R_{G(int)}$	--	2	--	Ω	
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit	
Drain-Source Diode Forward Voltage	$V_{GS}= -4V, I_{SD}=10A$	V_{SD}	--	3.7	--	V	
	$V_{GS}= -4V, I_{SD}=10A, T_J=175^\circ C$		--	3.1	--		
Diode Forward Current - Continuous	$V_{GS}= -4V, T_C=25^\circ C$	I_S	--	32	--	A	
Diode Forward Current - Pulsed with t_p Limited by T_{jmax}	$V_{GS}= -4V$	$I_{S,Pulse}$	--	70	--	A	
Peak Reverse Recovery Current	$V_R=800V, I_{SD}=20A, V_{GS}= -4V,$ $diff/dt = 2800 A/\mu s$	I_{rm}	--	9.5	--	A	
Reverse Recovery Time		T_{rr}	--	29.3	--	nS	
Reverse Recovery Charge		Q_{rr}	--	156.5	--	nC	

CHARACTERISTIC CURVES

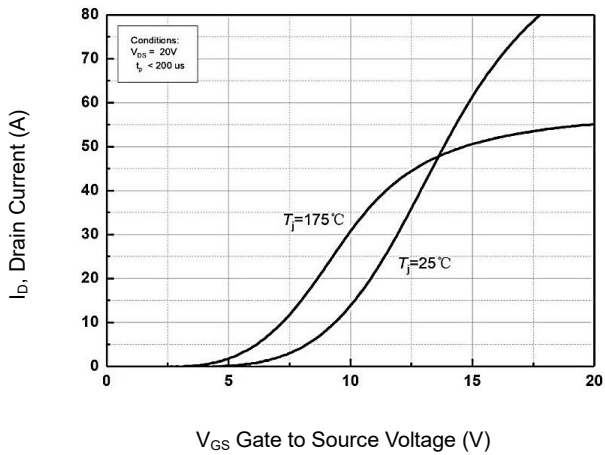
Output Characteristics



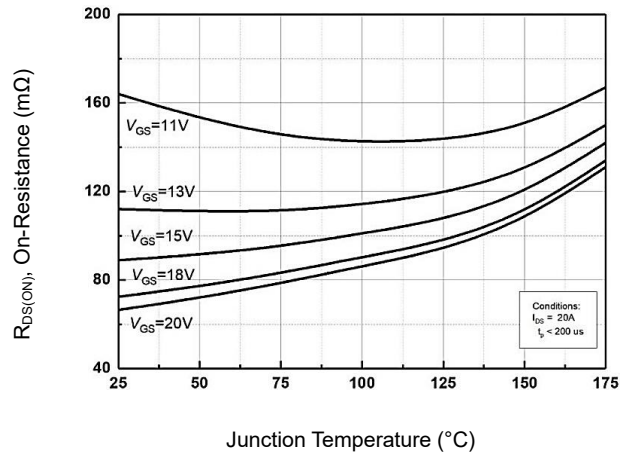
Output Characteristics



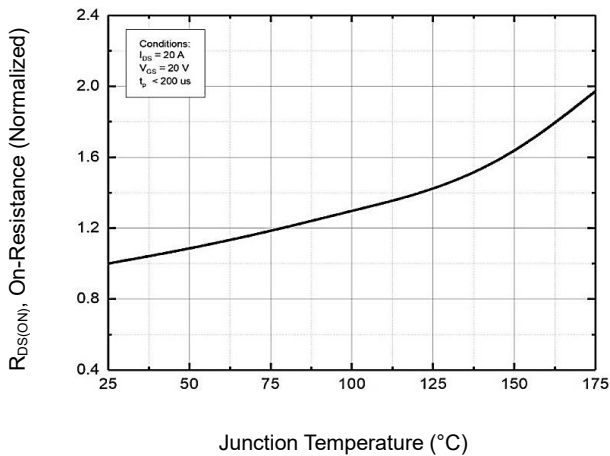
Transfer Characteristic



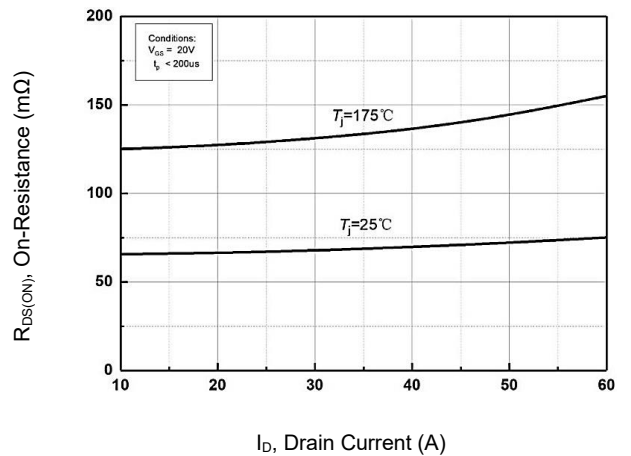
On-Resistance vs. Junction temperature for Vgs



Normalized On-Resistance vs. Junction temperature

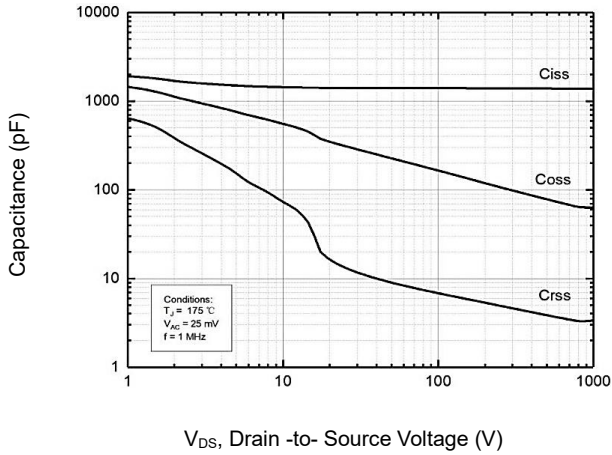


On-Resistance vs. Drain Current

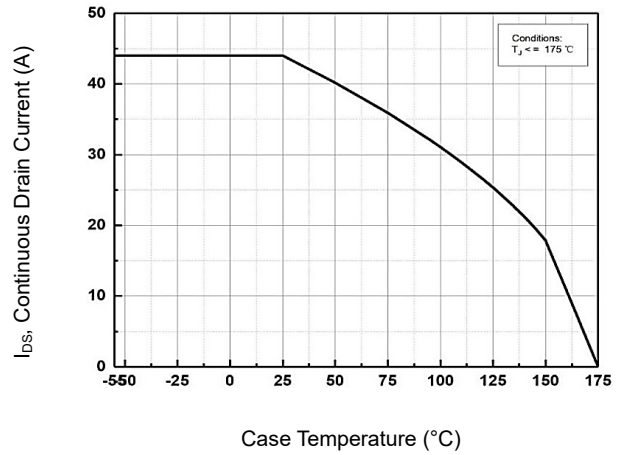


CHARACTERISTIC CURVES

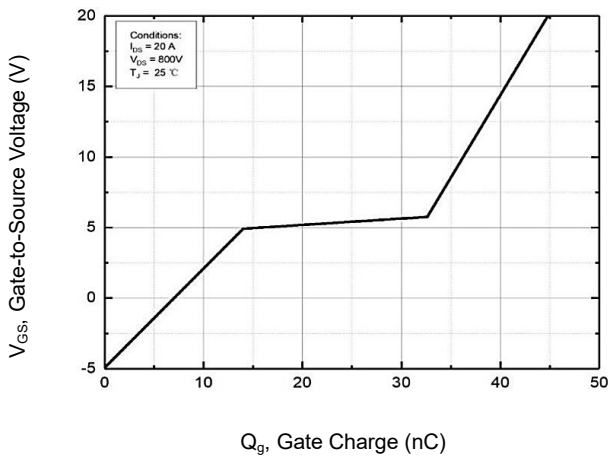
Capacitance vs. Drain-Source Voltage



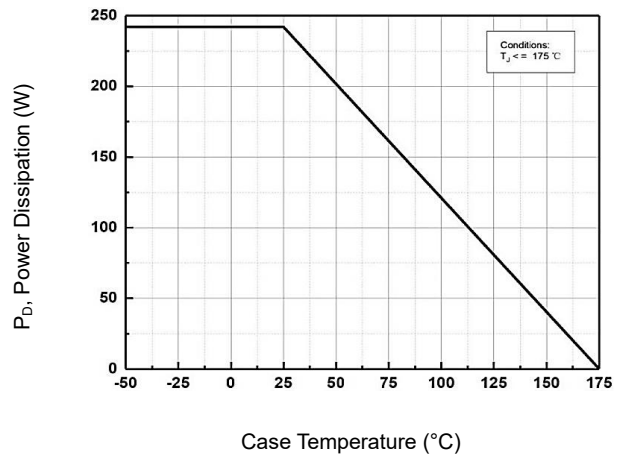
Continuous Drain Current vs. Case Temperature



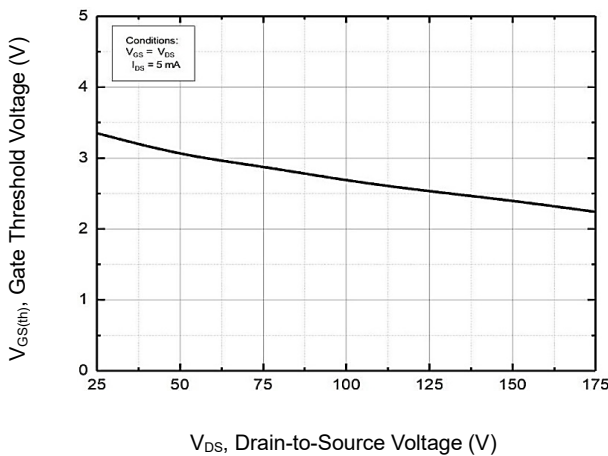
Gate-Charge Characteristics



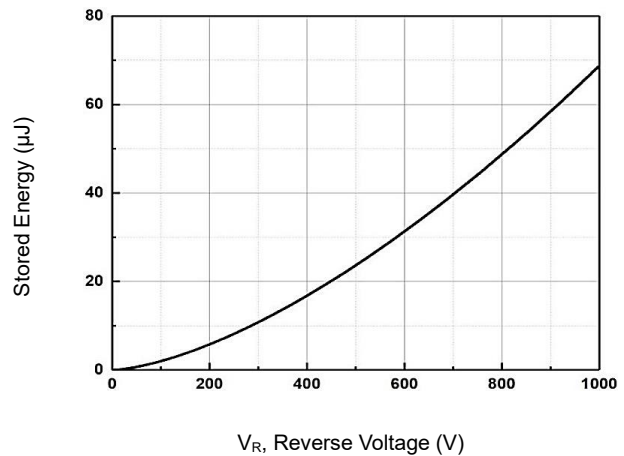
Maximum Power Dissipation Derating



Threshold Voltage vs. Junction temperature

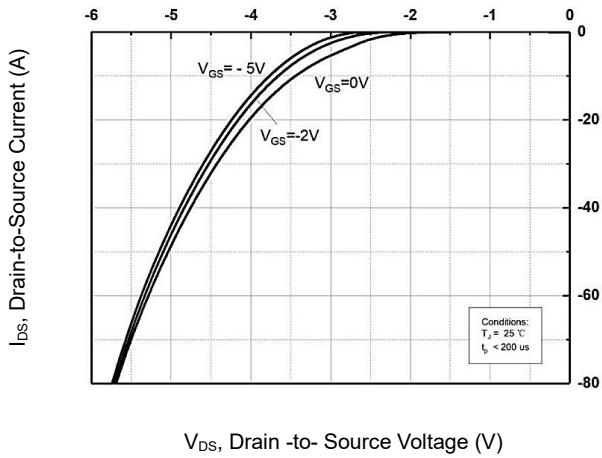


Output Capacitor Stored Energy

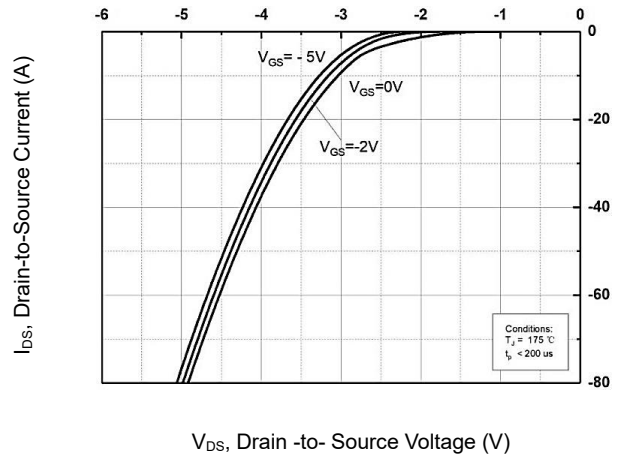


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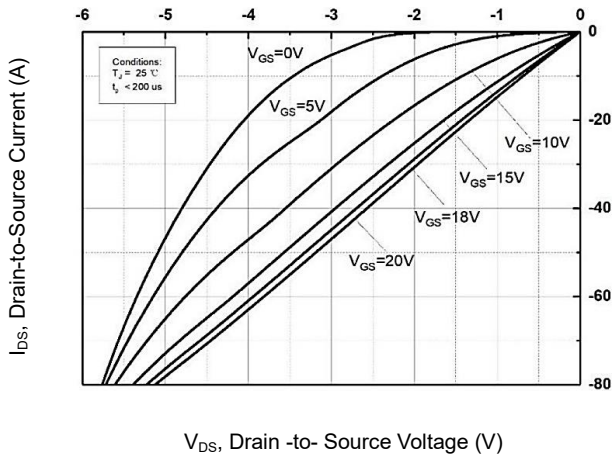
Body Diode Characteristics



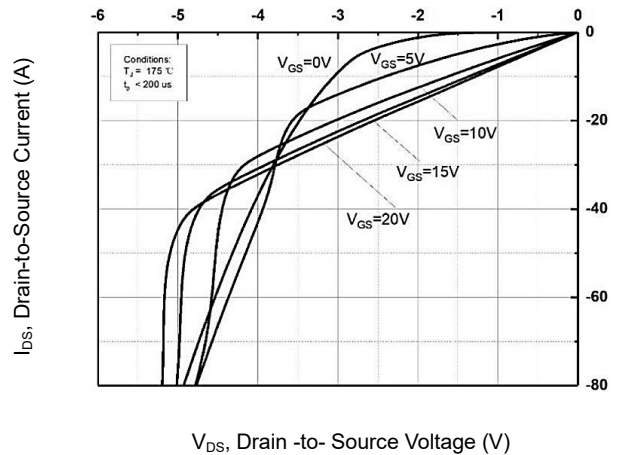
Body Diode Characteristics



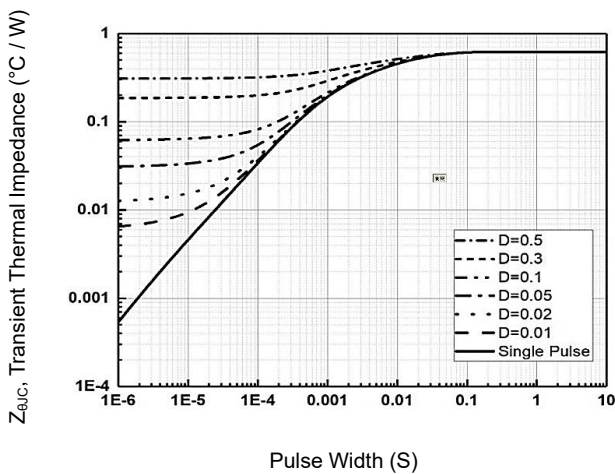
3rd Quadrant Characteristics



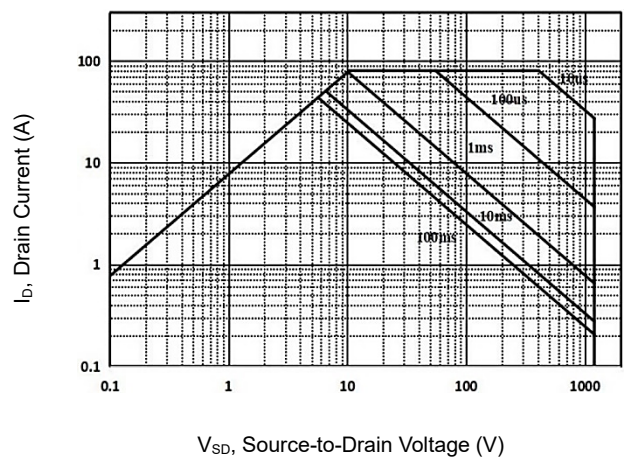
3rd Quadrant Characteristics



Transient Thermal Impedance

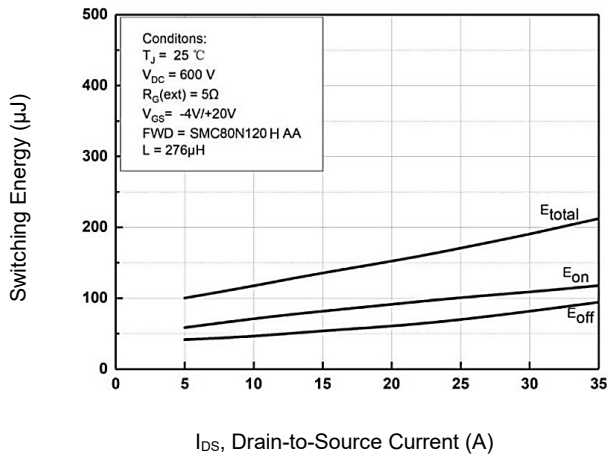


Safe Operating Area

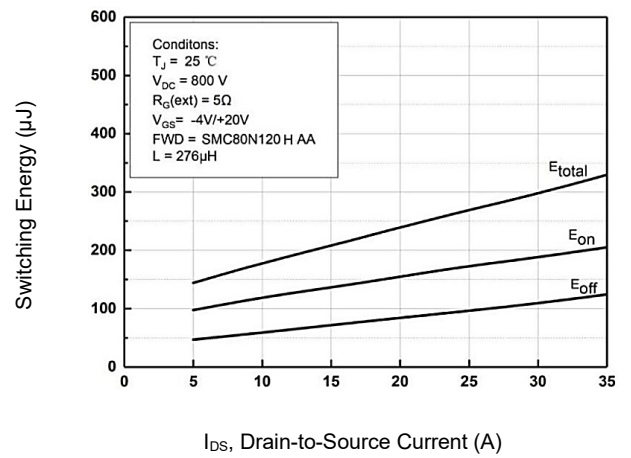


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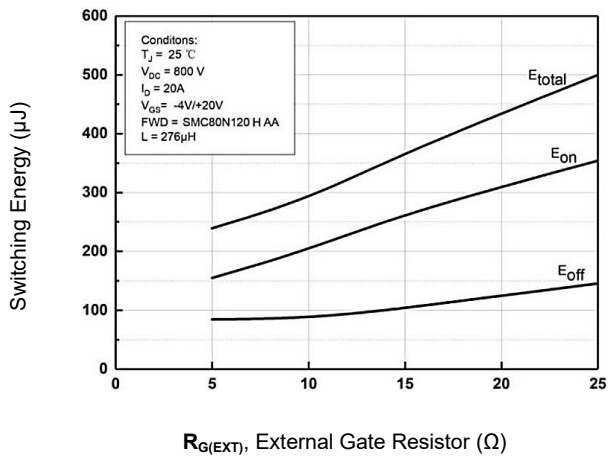
Switching energy vs Drain current at 600V



Switching energy vs Drain current at 800V



Clamped Inductive Switching Energy vs $R_{G(EXT)}$



Switching Times $R_{G(EXT)}$

