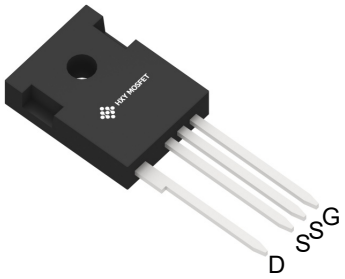
SC013N120TCL

SiC Power MOSFET N-Channel Enhancement Mode

Features

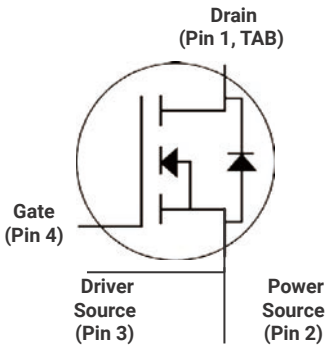
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Resistant to Latch-Up
- Halogen Free, RoHS Compliant



TO-247-4L

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High voltage DC/DC converters
- EV Motor drive



Ordering Part Number	Package	Qty(PCS)
SC013N120TCL	TO-247-4L	30

Maximum Ratings (T_C = 25 °C unless otherwise specifed)

Parameter	Symbol	Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	V_{GS}=0V, I_D=100uA	1200	V
Gate-Source Voltage	V_{GSmax}	Absolute maximum values	-10/+22	V
Gate-Source Voltage	V_{GSop}	Recommended operational values	-5/+18	V
Continuous Drain Current	I_D	V_{GS}=18V, T_C=25℃	167	A
		V_{GS}=18V, T_C=100℃	118	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	TBD	A
Power Dissipation	P_D	T_C=25℃, T_J=175℃	555	W
Operating Junction Temperature	$T_{vj, op}$		-55~175	℃
Storage Temperature Range	T_{stg}		-55~175	℃

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA		1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=20mA	T_{vj}=25℃		2.9		V
			T_{vj}=175℃		2.1		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V			1	100	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V			1	100	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=75A	T_{vj}=25℃		13		mΩ
			T_{vj}=175℃		20		
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=75A	T_{vj}=25℃		TBD		S
			T_{vj}=175℃		TBD		
Input Capacitance	C_{iss}	V_{GS}=0V V_{DS}=1200V f=100KHz V_{AC}=25mV			3815		pF
Output Capacitance	C_{oss}				239		
Reverse Transfer Capacitance	C_{rss}				29		
C_{oss} Stored Energy	E_{oss}				TBD		μJ
Turn-On Switching Energy	E_{ON}	V_{DS}=800V, V_{GS}=-5/18V I_D=75A, $R_{G(ext)}$=2.5Ω, L=250μH	T_{vj}=25℃		TBD		μJ
			T_{vj}=175℃		TBD		
Turn Off Switching Energy	E_{OFF}		T_{vj}=25℃		TBD		
			T_{vj}=175℃		TBD		
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-5/18V I_D=75A, $R_{G(ext)}$=2.5Ω, T_J=25℃, L=250μH Timing relative to V_{DS}			TBD		ns
Rise Time	t_r				TBD		
Turn-Off Delay Time	$t_{d(off)}$				TBD		
Fall Time	t_f				TBD		
Internal Gate Resistance	$R_{G(int)}$	f=1MHz, V_{AC}=25mV			TBD		Ω
Gate to Source Charge	Q_{gs}	V_{DS}=800V, V_{GS}=-5/18V I_D=75A			46		nC
Gate to Drain Charge	Q_{gd}				100		
Total Gate Charge	Q_g				216		

Body Diode Characteristic

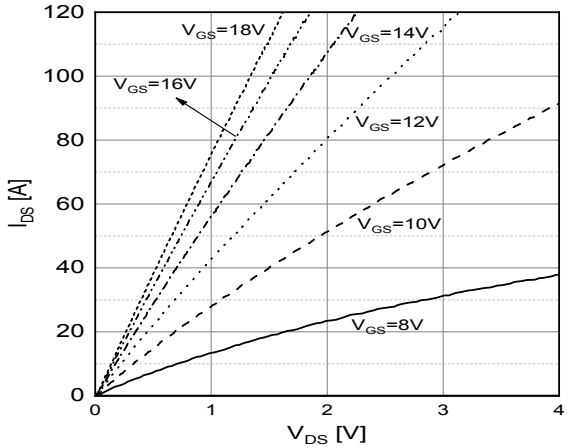
Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Diode Forward Voltage	V_{SD}	V_{GS}=-5V, I_{SD}=37.5A	T_{vj}=25℃		4.7		V
			T_{vj}=175℃		4.1		
Continuous Diode Forward Current	I_S	V_{GS}=-5V, T_C=25˚C				TBD	A
Diode Pulse Current	$I_{S(pulse)}$	V_{GS}=-5V, Pulse width t_p limited by T_{jmax}				TBD	A
Reverse Recovery Time	t_{rr}	V_{GS}=-5V I_{SD}=37.5A $R_{G(ext)}$=2.5Ω T_J=175℃ V_R=800V			TBD		ns
Reverse Recovery Charge	Q_{rr}				TBD		nC
Peak Reverse Recovery Current	I_{rrm}				TBD		A

Thermal Characteristics

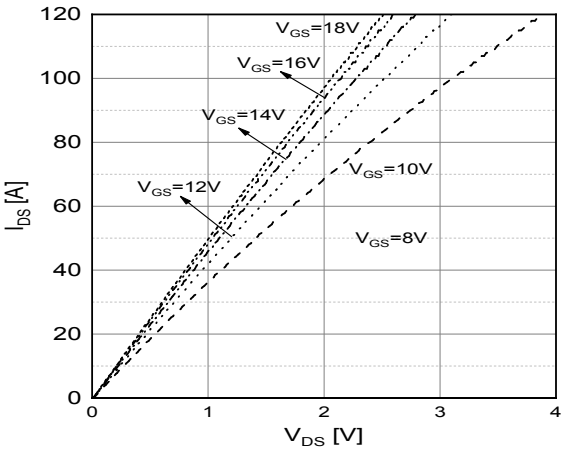
Parameter	Symbol	Condition	Value			Unit
			Min	Typ.	Max	
Thermal Resistance: Junction to Case	$R_{th(J-C)}$			0.27	0.37	℃/W

Typical Performance

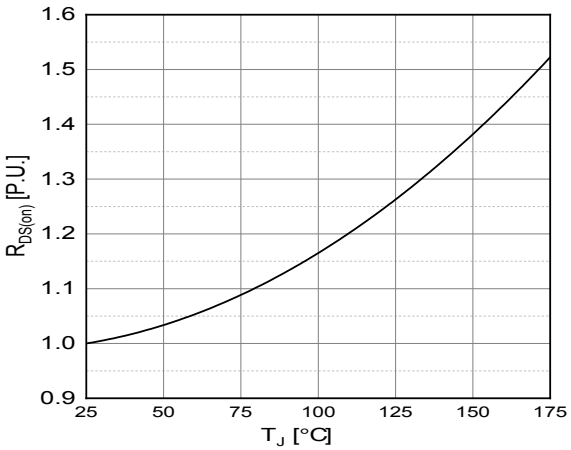
Output Characteristics
$I_{DS}=f(V_{DS})$, $T_J=25°C$



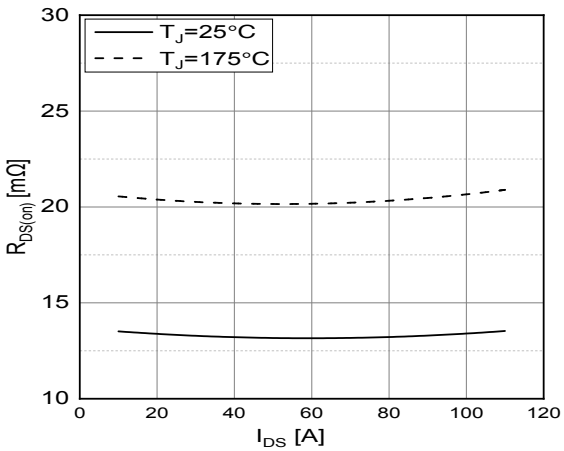
Output Characteristics
$I_{DS}=f(V_{DS})$, $T_J=175°C$



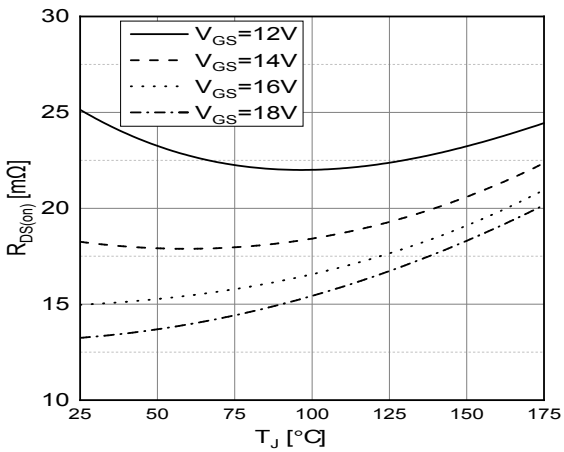
Normalized On-Resistance
$R_{DS(on)}=f(T_J)$, $I_{DS}=75A$, $V_{GS}=18V$



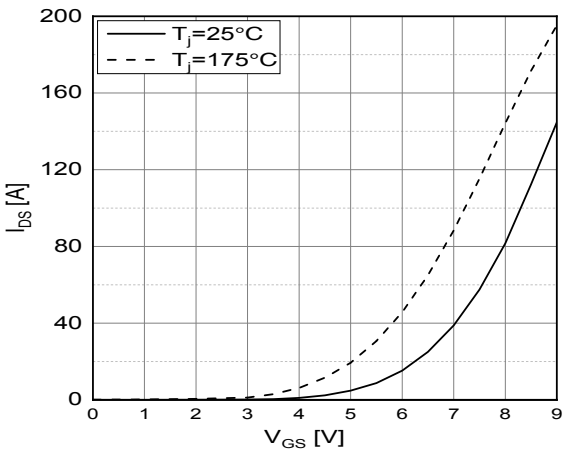
On-Resistance
$R_{DS(on)}=f(I_{DS})$, $V_{GS}=18V$



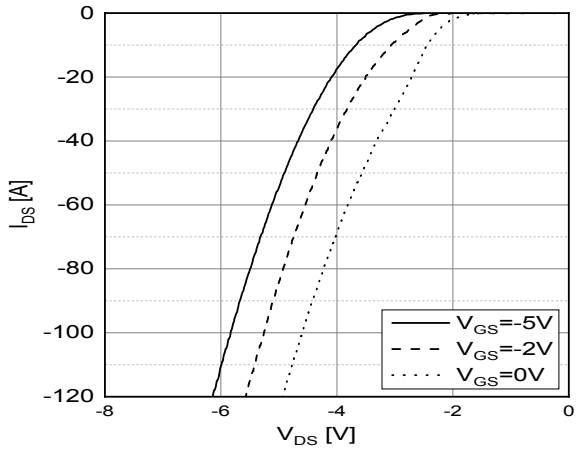
On-Resistance
$R_{DS(on)}=f(T_J)$, $I_{DS}=75A$



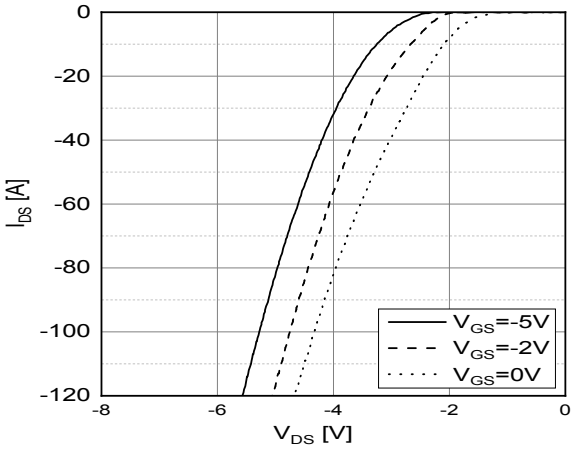
Transfer Characteristics
$I_{DS}=f(V_{GS})$, $V_{DS}=20V$



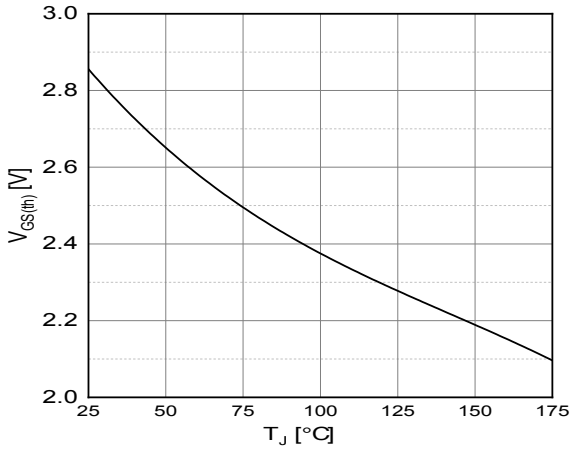
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, $T_J=25$°C



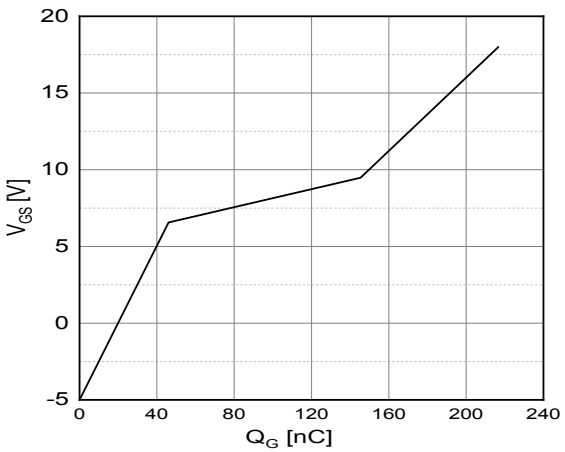
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, $T_J=175$°C



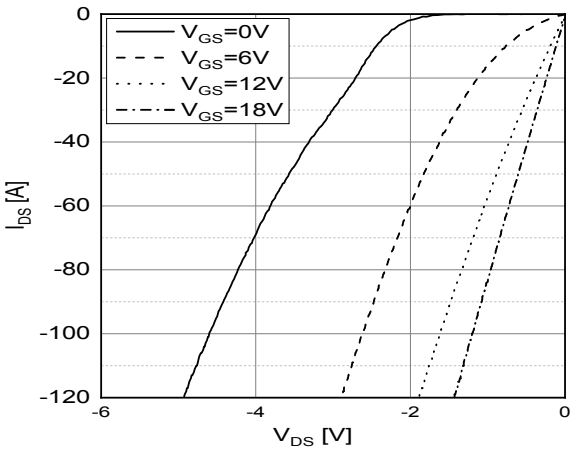
Threshold Voltage
$V_{GS(th)}=f(T_J)$, $V_{GS}=V_{DS}$, $I_{DS}=20$mA



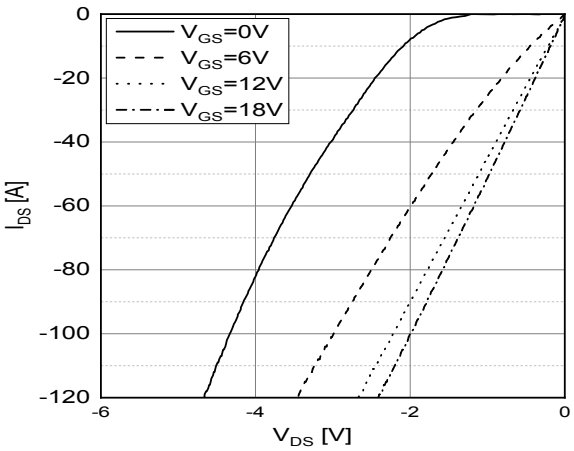
Gate Charge Characteristics
$V_{GS}=f(Q_G)$, $I_{DS}=75$A, $I_{GS}=50$mA, $V_{DS}=800$V, $T_J=25$°C



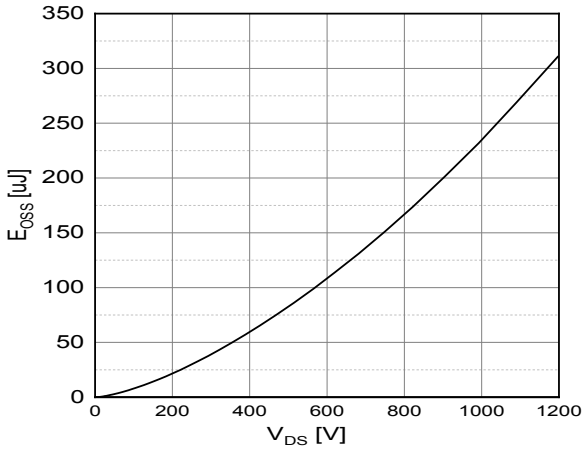
3rd Quadrant Characteristics
$I_{DS}=f(V_{DS})$, $T_J=25$°C



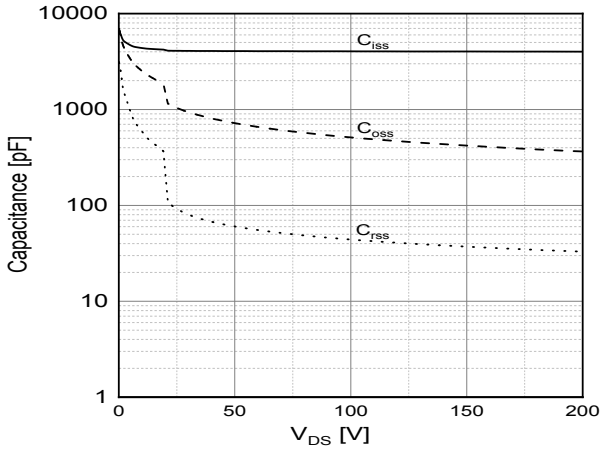
3rd Quadrant Characteristics
$I_{DS}=f(V_{DS})$, $T_J=175$°C



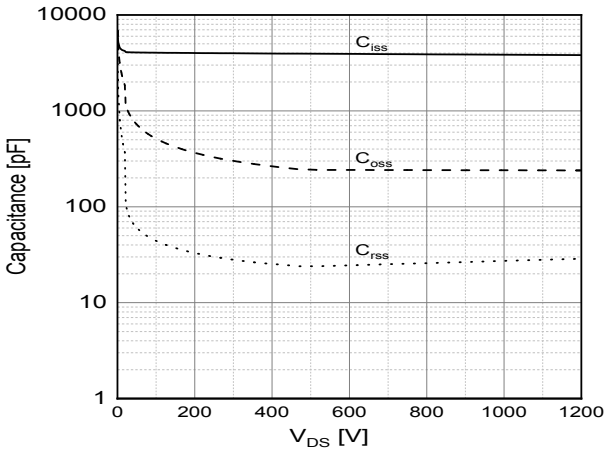
Output Capacitor Stored Energy
$E_{OSS}=f(V_{DS})$



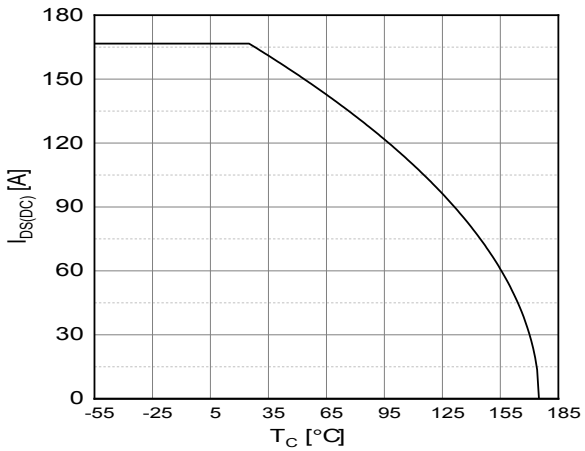
Capacitances
Capacitances=f(V_{DS}), T_J=25°C, V_{AC}=25mV, f=100KHz, (0-200V)



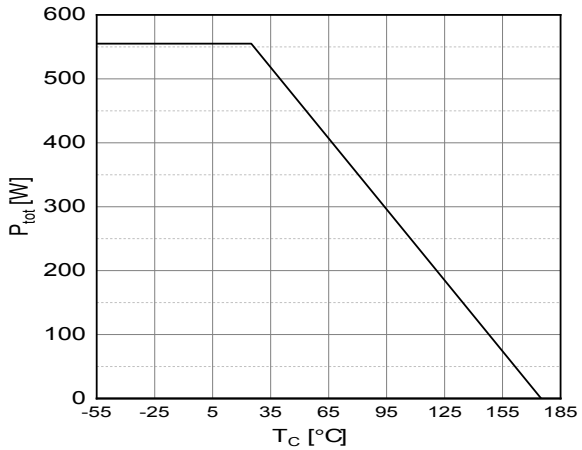
Capacitances
Capacitances=f(V_{DS}), T_J=25°C, V_{AC}=25mV, f=100KHz, (0-1200V)



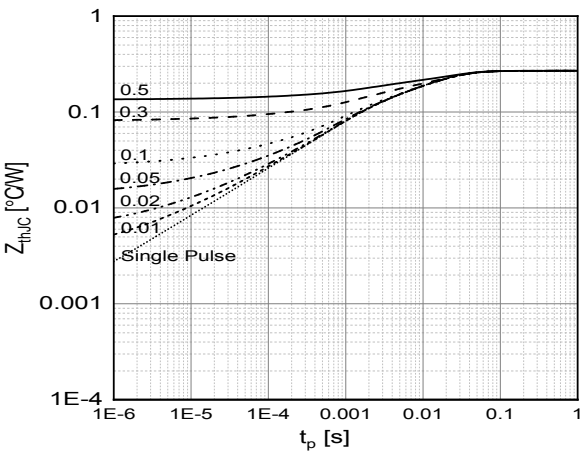
Continuous Drain Current Derating
$I_{DS(DC)}=f(T_C)$, T_J≤175°C



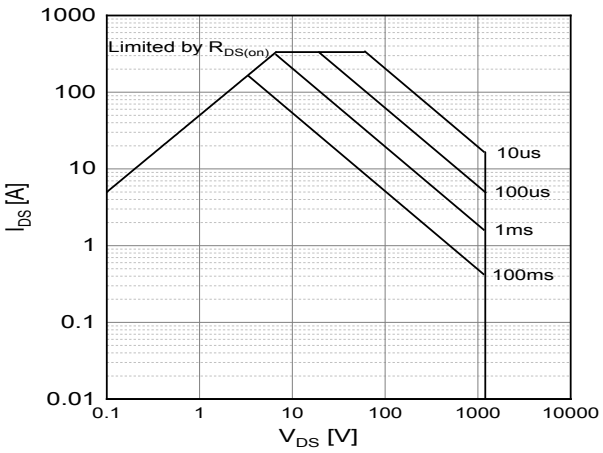
Maximum Power Dissipation Derating
$P_{tot}=f(T_C)$, T_J≤175°C



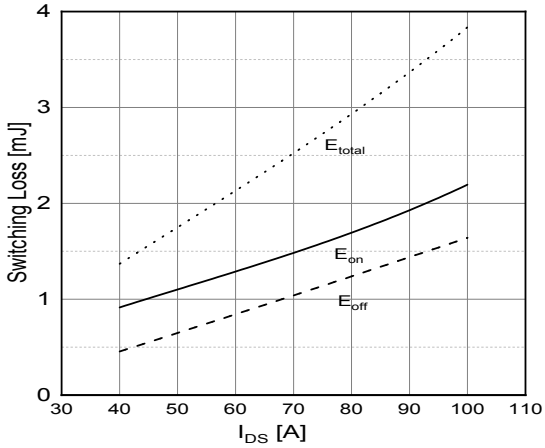
Transient Thermal Impedance (Junction-Case)
$Z_{thJC}=f(t_p)$



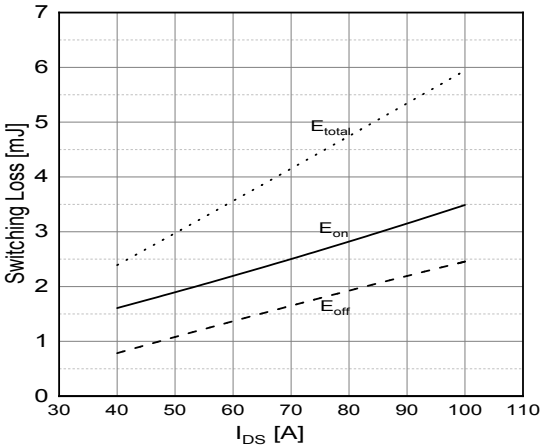
Safe Operating Area
$I_{DS}=f(V_{DS})$, $T_C=25°C$, D=0, Parameter: t_p



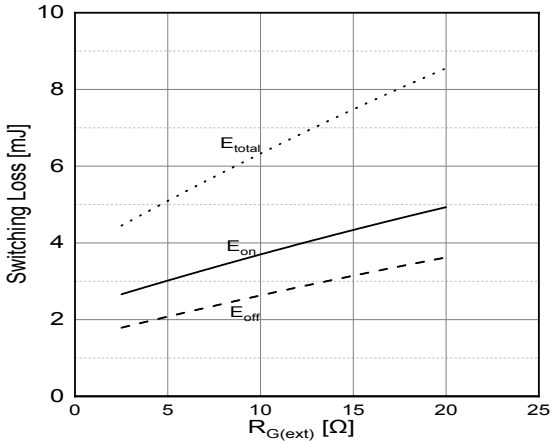
Switching Energy
Switching Loss=f(I_{DS}), $T_J=25°C$, $V_{DD}=600V$, $R_{G(ext)}=2.5Ω$, $V_{GS}=-5V/+18V$, L=150uH



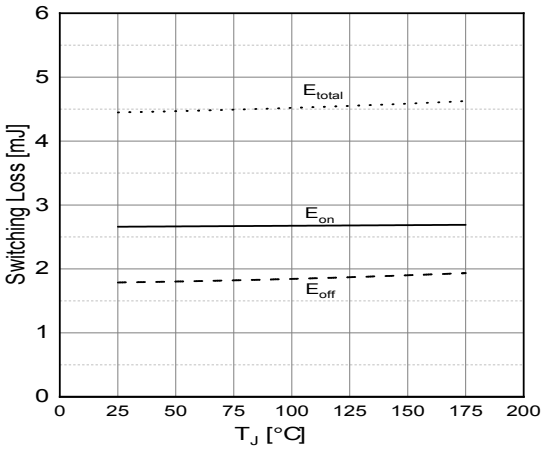
Switching Energy
Switching Loss=f(I_{DS}), $T_J=25°C$, $V_{DD}=800V$, $R_{G(ext)}=2.5Ω$, $V_{GS}=-5V/+18V$, L=150uH



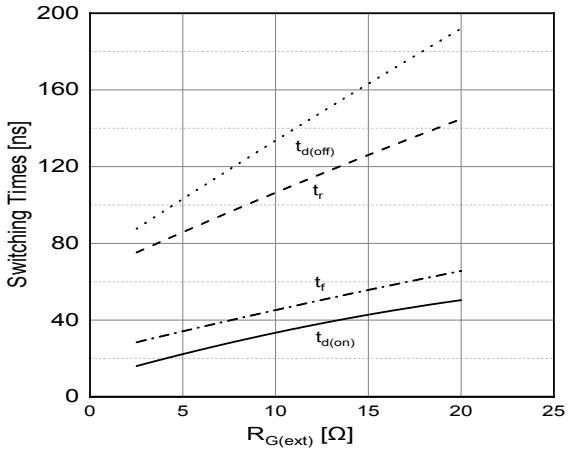
Switching Energy
Switching Loss=f($R_{G(ext)}$), $T_J=25°C$, $V_{DD}=800V$, $I_{DS}=75A$, $V_{GS}=-5V/+18V$, L=150uH



Switching Energy
Switching Loss=f(T_J), $V_{DD}=800V$, $I_{DS}=75A$, $R_{G(ext)}=2.5Ω$, $V_{GS}=-5V/+18V$, L=150uH

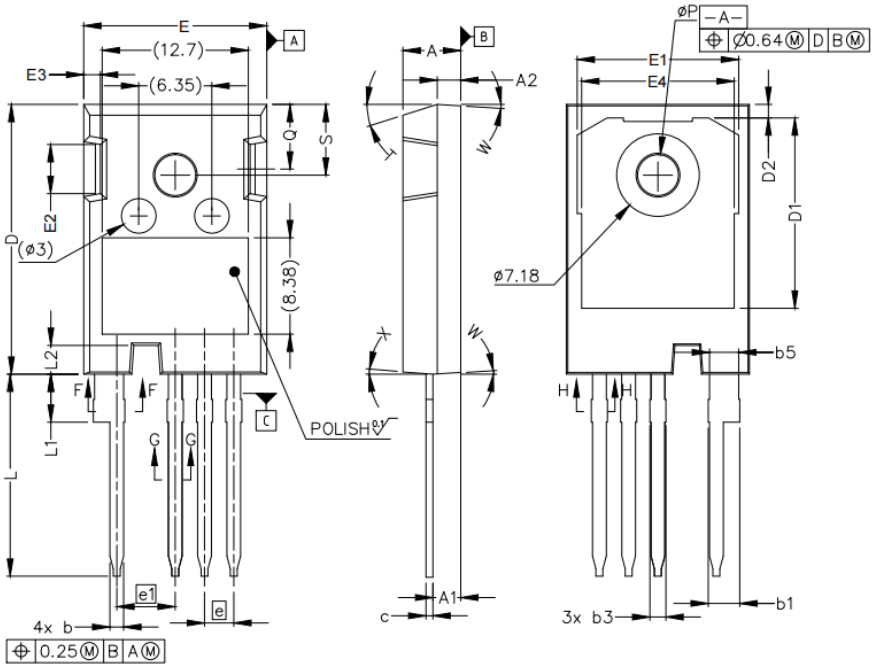


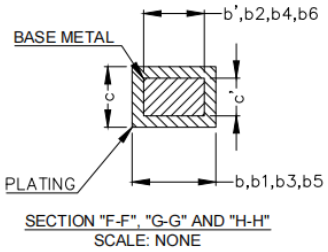
Switching Times
Switching Times=f($R_{G(ext)}$), $T_J=25°C$, $V_{DD}=800V$, $I_{DS}=75A$, $V_{GS}=-5V/+18V$, L=150uH



Package Dimensions

Package TO-247-4L





SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

SYMBOL	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5 ° REF.	
X	4° REF.	

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