

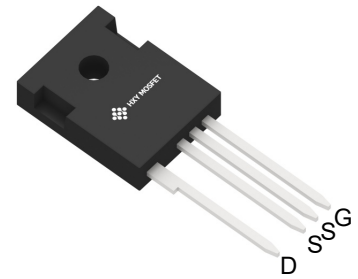


Features

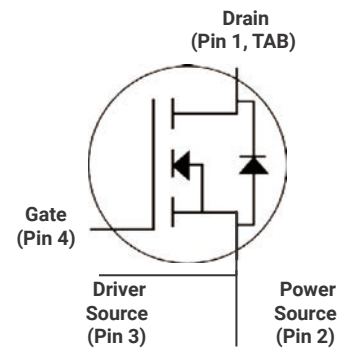
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Resistant to Latch-Up
- Halogen Free, RoHS Compliant

Applications

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



TO-247-4L



Ordering Part Number	Package	Qty(PCS)
NTH4L013N120M3S	TO-247-4L	30



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

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°C	167	A
		V _{GS} =18V, T _c =100°C	118	
Pulsed Drain Current	I _{D(pulse)}	Pulse width t _p limited by T _{jmax}	TBD	A
Power Dissipation	P _D	T _c =25°C, T _j =175°C	555	W
Operating Junction Temperature	T _{vj, op}		-55~175	°C
Storage Temperature Range	T _{stg}		-55~175	°C



Electrical Characteristic (at $T_j = 25^\circ\text{C}$, 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°C		2.9		V
			T _{vj} =175°C		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°C		13		mΩ
			T _{vj} =175°C		20		
Transconductance	g _{fs}	V _{DS} =20V, I _{DS} =75A	T _{vj} =25°C		TBD		S
			T _{vj} =175°C		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°C		TBD		μJ
Turn Off Switching Energy	E _{OFF}		T _{vj} =175°C		TBD		
			T _{vj} =25°C		TBD		
			T _{vj} =175°C		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°C, 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}	$V_{GS}=-5V, I_{SD}=37.5A$		4.7		V
				4.1		
Continuous Diode Forward Current	I_S	$V_{GS}=-5V, T_C=25^{\circ}C$			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}	$V_{GS}=-5V$ $I_{SD}=37.5A$ $R_{G(ext)}=2.5\Omega$ $T_J=175^{\circ}C$ $V_R=800V$		TBD		ns
Reverse Recovery Charge	Q_{rr}			TBD		nC
Peak Reverse Recovery Current	I_{rrm}			TBD		A

Thermal Characteristics

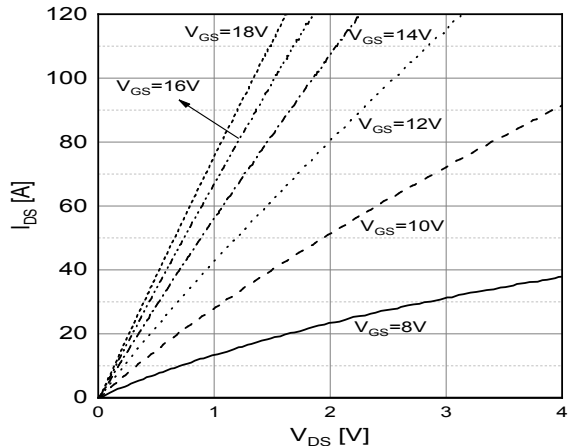
Parameter	Symbol	Condition	Value			Unit
			Min	Typ.	Max	
Thermal Resistance: Junction to Case	$R_{th(j-c)}$			0.27	0.37	$^{\circ}C/W$



Typical Performance

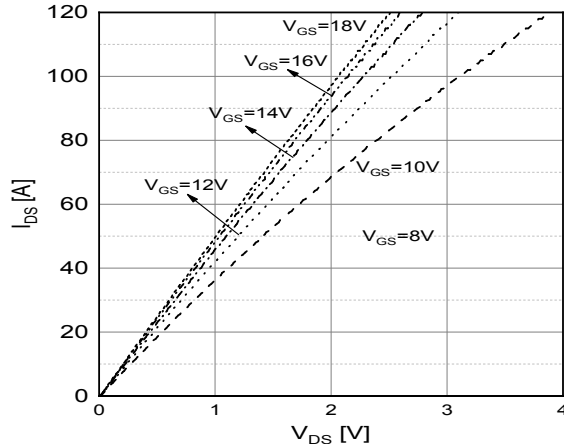
Output Characteristics

$I_{DS}=f(V_{DS}), T_J=25^{\circ}\text{C}$



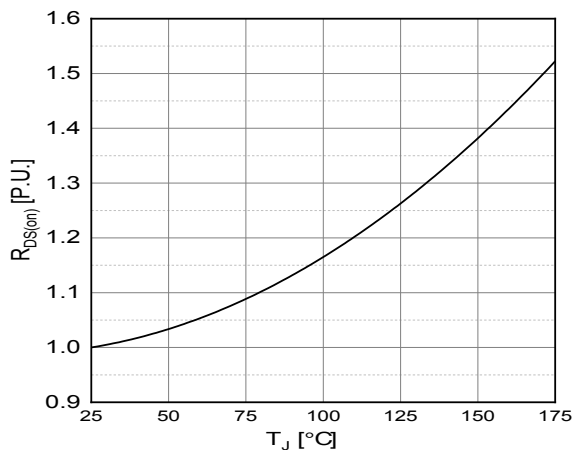
Output Characteristics

$I_{DS}=f(V_{DS}), T_J=175^{\circ}\text{C}$



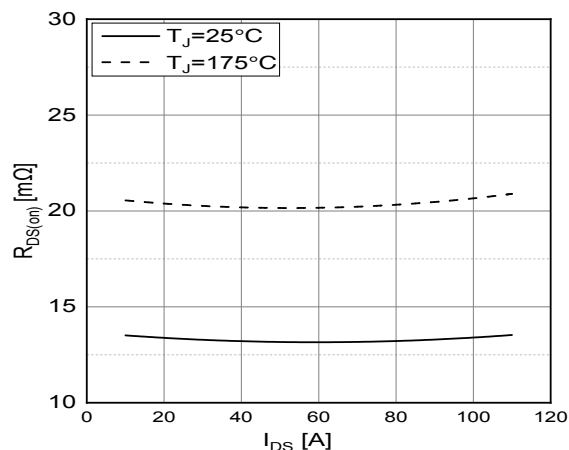
Normalized On-Resistance

$R_{DS(on)}=f(T_J), I_{DS}=75\text{A}, V_{GS}=18\text{V}$



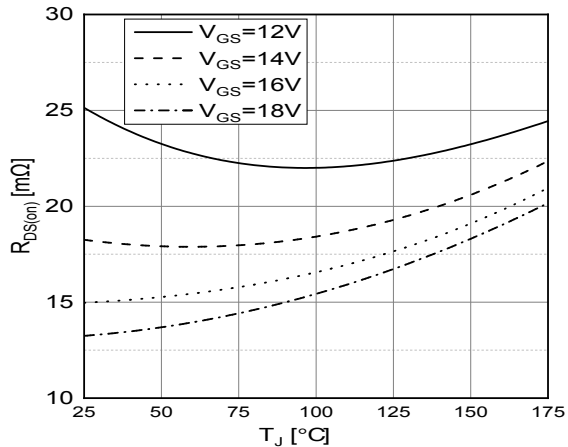
On-Resistance

$R_{DS(on)}=f(I_{DS}), V_{GS}=18\text{V}$



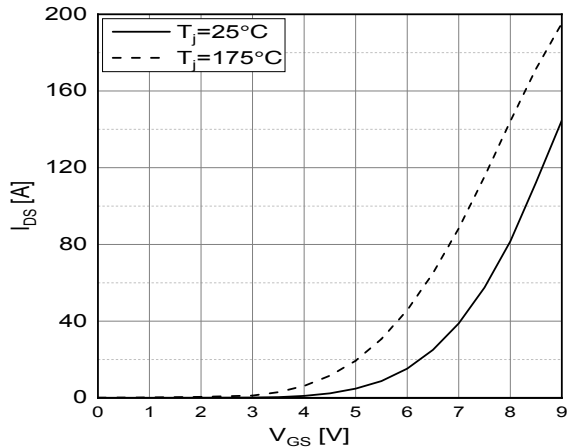
On-Resistance

$R_{DS(on)}=f(T_J), I_{DS}=75\text{A}$



Transfer Characteristics

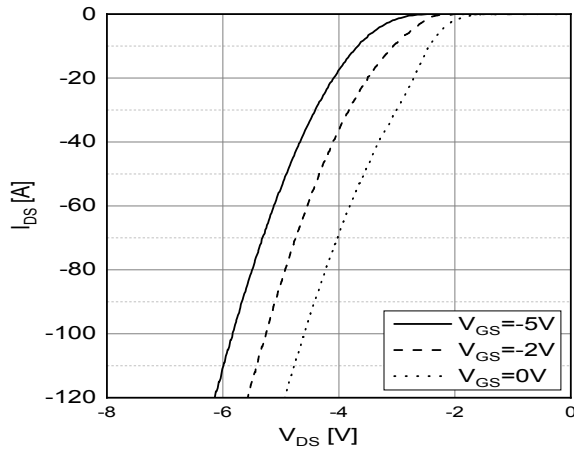
$I_{DS}=f(V_{GS}), V_{DS}=20\text{V}$





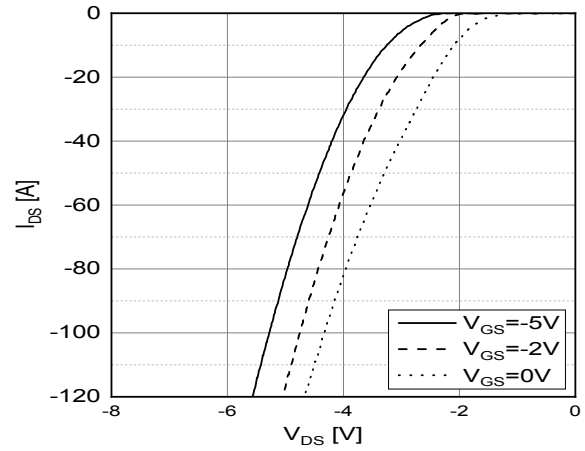
Body Diode Characteristics

$I_{DS}=f(V_{DS})$, $T_J=25^\circ\text{C}$



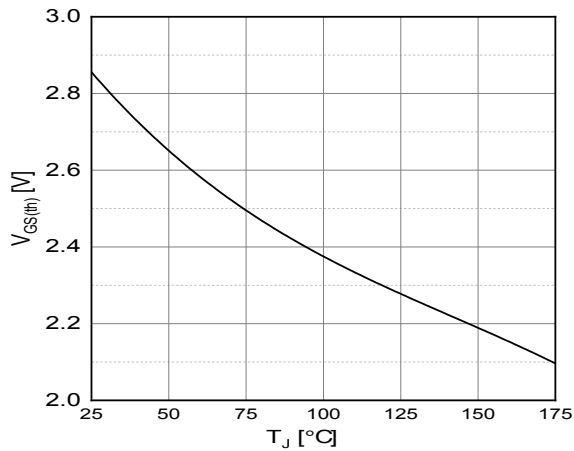
Body Diode Characteristics

$I_{DS}=f(V_{DS})$, $T_J=175^\circ\text{C}$



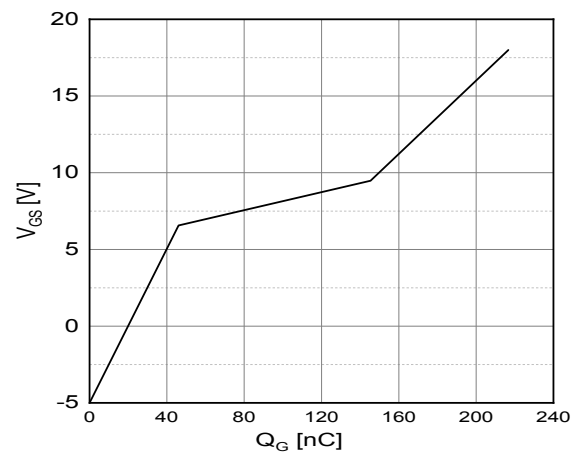
Threshold Voltage

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



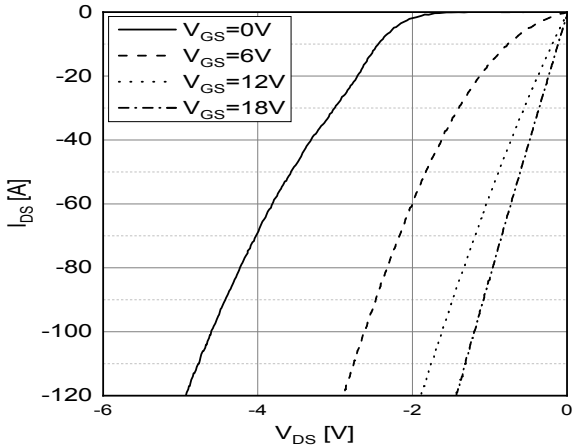
Gate Charge Characteristics

$V_{GS}=f(Q_G)$, $I_{DS}=75\text{A}$, $I_{GS}=50\text{mA}$, $V_{DS}=800\text{V}$, $T_J=25^\circ\text{C}$



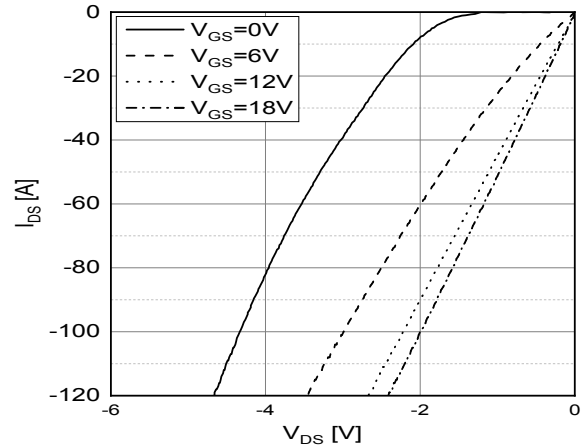
3rd Quadrant Characteristics

$I_{DS}=f(V_{DS})$, $T_J=25^\circ\text{C}$



3rd Quadrant Characteristics

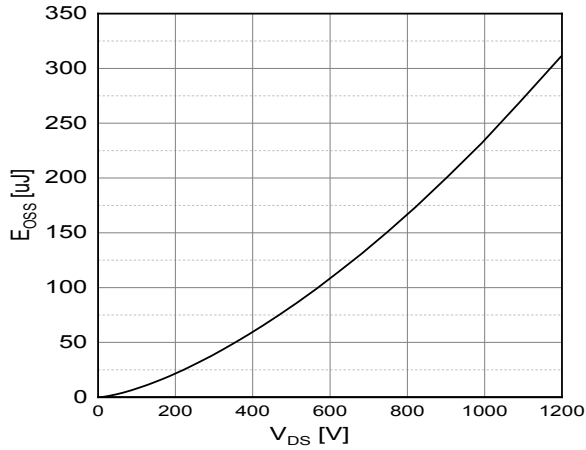
$I_{DS}=f(V_{DS})$, $T_J=175^\circ\text{C}$





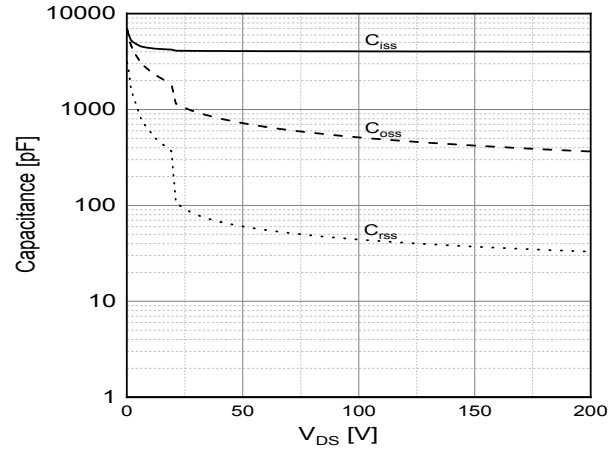
Output Capacitor Stored Energy

$$E_{OSS}=f(V_{DS})$$



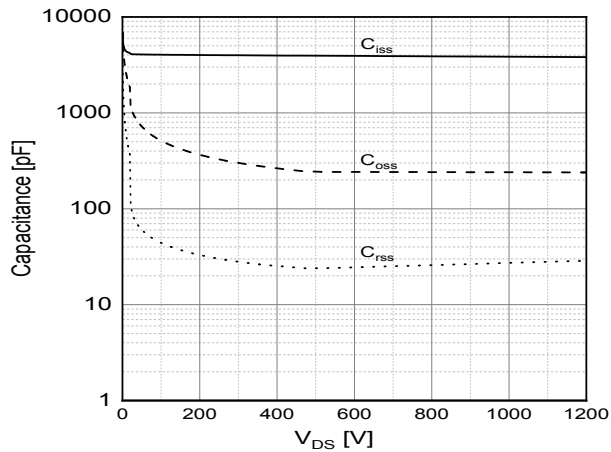
Capacitances

$$\text{Capacitances}=f(V_{DS}), T_J=25^{\circ}\text{C}, V_{AC}=25\text{mV}, f=100\text{KHz}, (0-200\text{V})$$



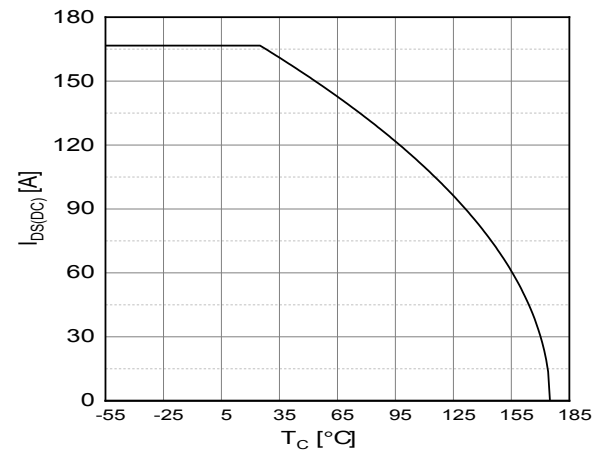
Capacitances

$$\text{Capacitances}=f(V_{DS}), T_J=25^{\circ}\text{C}, V_{AC}=25\text{mV}, f=100\text{KHz}, (0-1200\text{V})$$



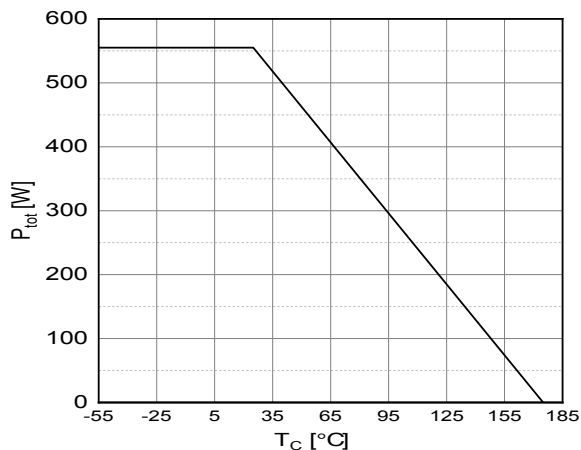
Continuous Drain Current Derating

$$I_{DS(DC)}=f(T_C), T_J\leq 175^{\circ}\text{C}$$



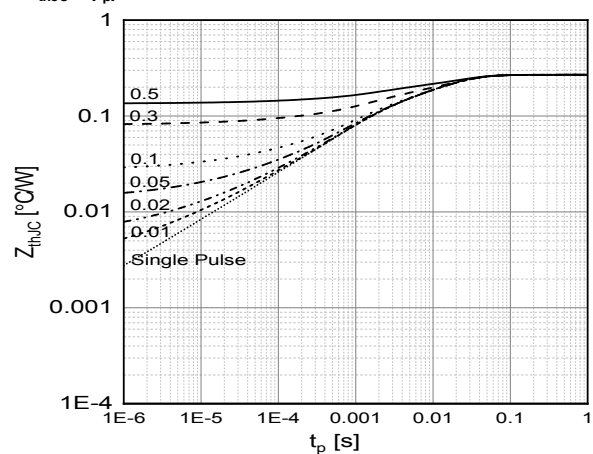
Maximum Power Dissipation Derating

$$P_{tot}=f(T_C), T_J\leq 175^{\circ}\text{C}$$



Transient Thermal Impedance (Junction-Case)

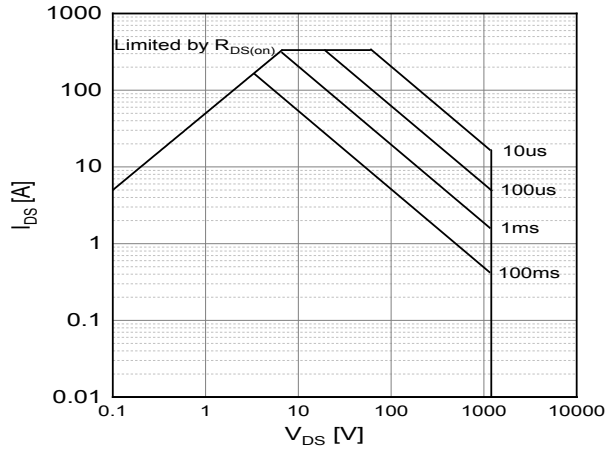
$$Z_{thJC}=f(t_p)$$





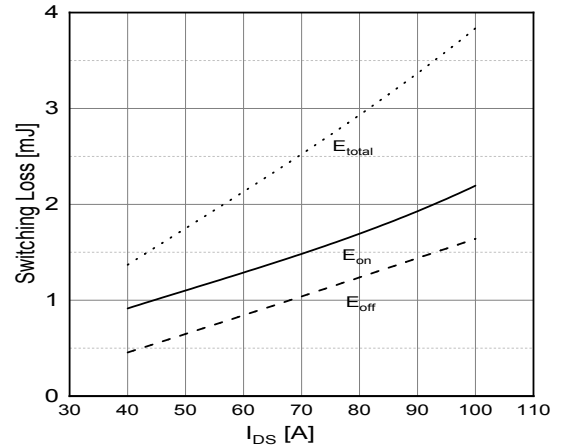
Safe Operating Area

$I_{DS}=f(V_{DS})$, $T_C=25^\circ\text{C}$, $D=0$, Parameter: t_p



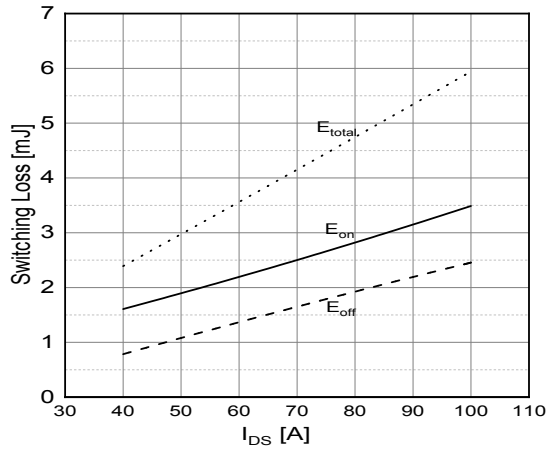
Switching Energy

Switching Loss= $f(I_{DS})$, $T_J=25^\circ\text{C}$, $V_{DD}=600\text{V}$, $R_{G(ext)}=2.5\Omega$, $V_{GS}=-5\text{V}/+18\text{V}$, $L=150\mu\text{H}$



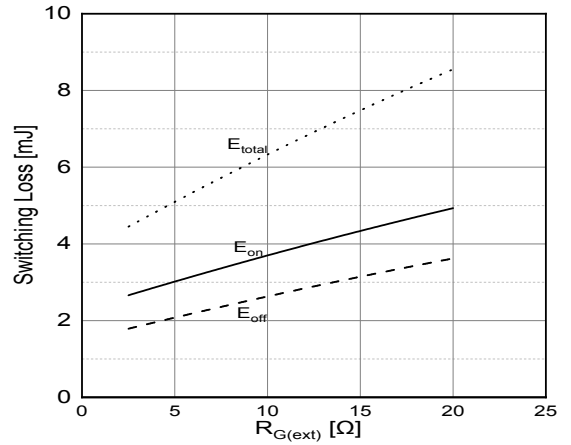
Switching Energy

Switching Loss= $f(I_{DS})$, $T_J=25^\circ\text{C}$, $V_{DD}=800\text{V}$, $R_{G(ext)}=2.5\Omega$, $V_{GS}=-5\text{V}/+18\text{V}$, $L=150\mu\text{H}$



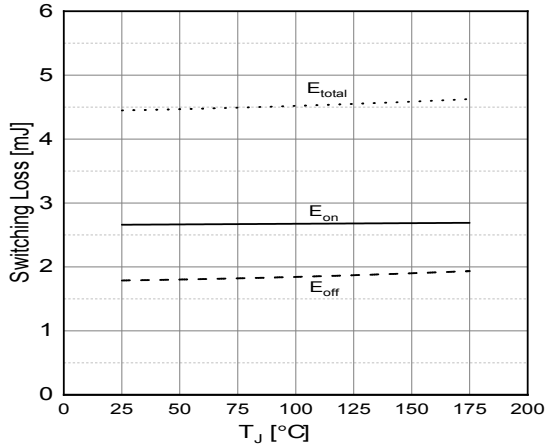
Switching Energy

Switching Loss= $f(R_{G(ext)})$, $T_J=25^\circ\text{C}$, $V_{DD}=800\text{V}$, $I_{DS}=75\text{A}$, $V_{GS}=-5\text{V}/+18\text{V}$, $L=150\mu\text{H}$



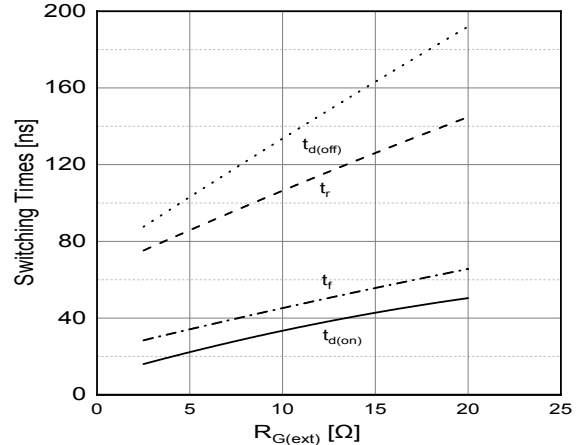
Switching Energy

Switching Loss= $f(T_J)$, $V_{DD}=800\text{V}$, $I_{DS}=75\text{A}$, $R_{G(ext)}=2.5\Omega$, $V_{GS}=-5\text{V}/+18\text{V}$, $L=150\mu\text{H}$



Switching Times

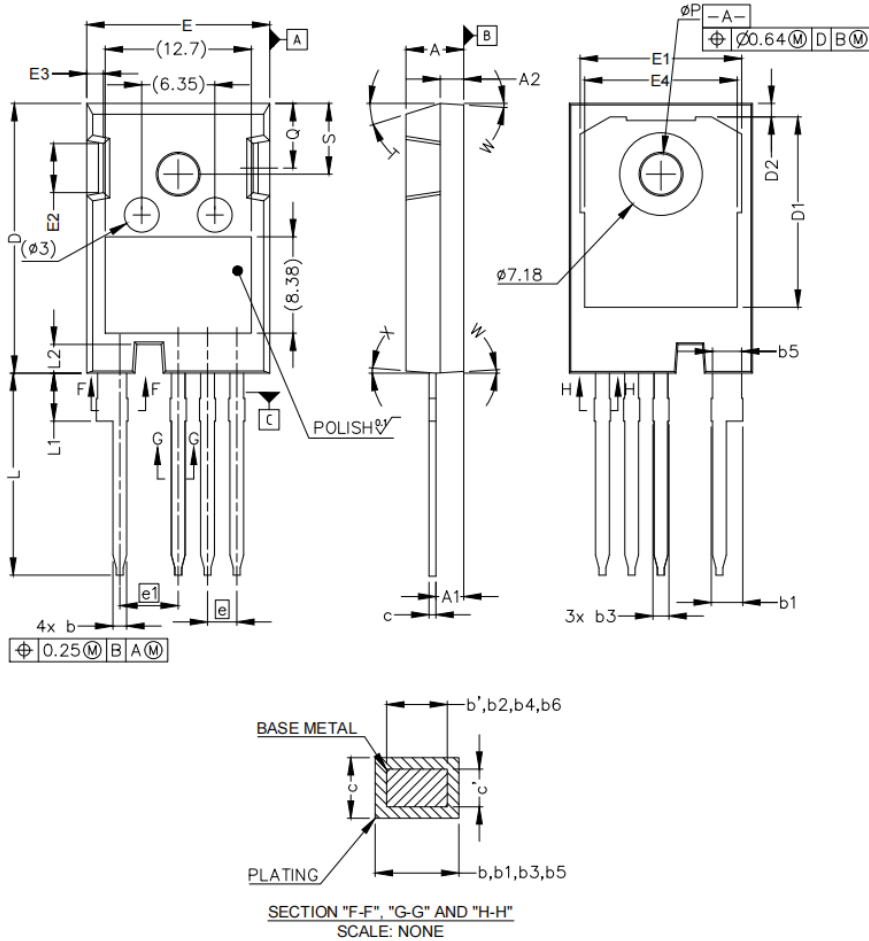
Switching Times= $f(R_{G(ext)})$, $T_J=25^\circ\text{C}$, $V_{DD}=800\text{V}$, $I_{DS}=75\text{A}$, $V_{GS}=-5\text{V}/+18\text{V}$, $L=150\mu\text{H}$





Package Dimensions

Package TO-247-4L



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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