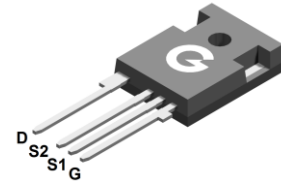
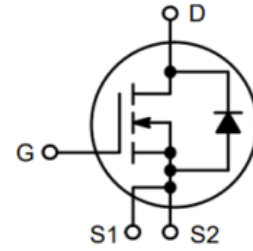


Features

- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Low switching losses
- Sense pin for optimized switching performance
- RoHS compliant with Halogen-free

HF



TO-247-4L

Applications

- Solar inverters
- On Board Charger
- Switch Mode Power Supplies

Mechanical Data

- Case: TO-247-4L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matted-Tin plated; Solderable Per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GSC3D120R040U4	TO-247-4L	30 pcs / Tube	3D120R040

Maximum Ratings (@ $T_c = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	1200	V
Gate-to-Source Voltage (transient)	V_{GS}	-8/+19	V
Gate-to-Source Voltage (static)		-4/+15	
Continuous Drain Current ($T_c = 25^\circ\text{C}$)	I_D	65	A
Continuous Drain Current ($T_c = 100^\circ\text{C}$)		46	
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_c = 25^\circ\text{C}$)	I_{DM}	200	A
Single Pulse Avalanche Energy ($L = 1\text{mH}$) ^{*2}	E_{AS}	25	mJ
Power Dissipation ($T_c = 25^\circ\text{C}$)	P_D	375	W
Operating Junction Temperature Range	T_J	-55 ~ +175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	0.35	0.4	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	-	-	45	$^\circ\text{C/W}$

Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 100μA	1200	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 1200V, V _{GS} = 0V	-	-	10	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = 19V, V _{DS} = 0V	-	-	100	nA
		V _{GS} = -8V, V _{DS} = 0V	-	-	-100	
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *1	V _{GS} = 18V, I _D = 25A, T _J = 25°C	-	31	45	mΩ
		V _{GS} = 18V, I _D = 25A, T _J = 175°C	-	61	-	
		V _{GS} = 15V, I _D = 25A, T _J = 25°C	-	35	55	
		V _{GS} = 15V, I _D = 25A, T _J = 175°C	-	63	-	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 10mA	1.7	2.5	3.1	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	2.7	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 800V f = 1MHz	-	1650	-	pF
C _{OSS}	Output Capacitance		-	80	-	
C _{RSS}	Reverse Transfer Capacitance		-	6	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{DD} = 800V V _{GS} = -4/15V I _D = 25A R _G = 5Ω	-	18	-	ns
t _r	Turn-on Rise Time		-	36	-	
t _{d(OFF)}	Turn-Off Delay Time		-	42	-	
t _f	Turn-Off Fall Time		-	25	-	
E _{on}	Turn-On Energy		-	260	-	μJ
E _{off}	Turn-Off Energy		-	68	-	
Q _G	Total Gate-Charge	V _{DD} = 800V	-	81.5	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = -4/15V	-	27.5	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = 25A	-	22.5	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *1	I _{SD} = 25A, V _{GS} = -4V, T _J = 25°C	-	4.8	-	V
		I _{SD} = 25A, V _{GS} = -4V, T _J = 175°C	-	4.2	-	
trr	Reverse Recovery Time	I _F = 25A, V _R = 400V	-	40	-	ns
Qrr	Reverse Recovery Charge	di/dt = 300A/μs	-	70	-	nC

Notes:

- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 120V, V_{GS} = 18V, L = 1mH$

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

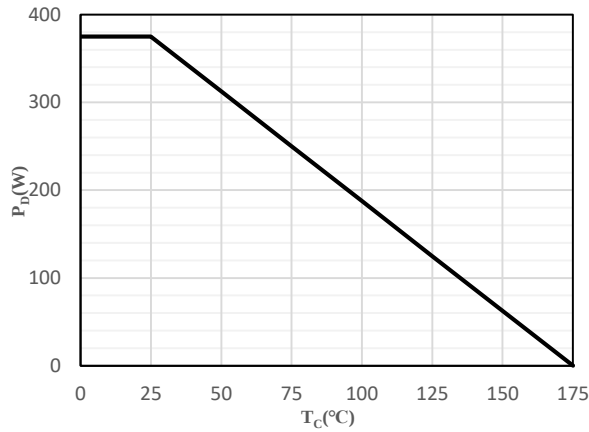


Fig 1 Power Dissipation

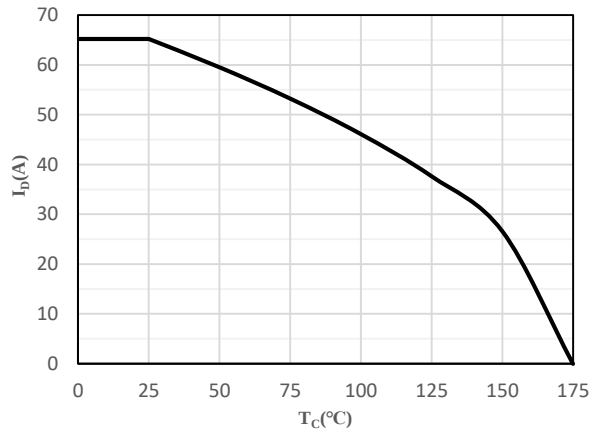


Fig 2 Drain Current

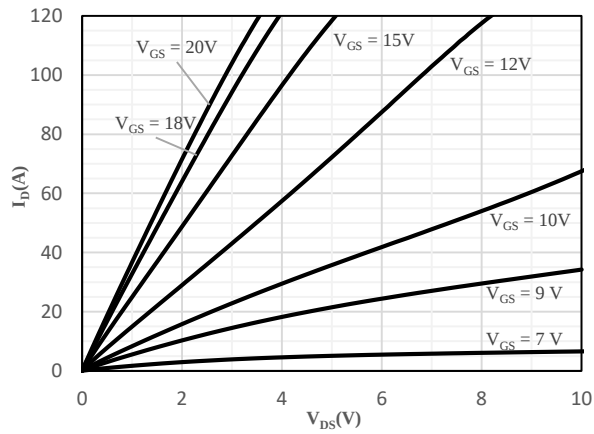


Fig 3 Typical Output Characteristics ($T_j = -55^\circ\text{C}$)

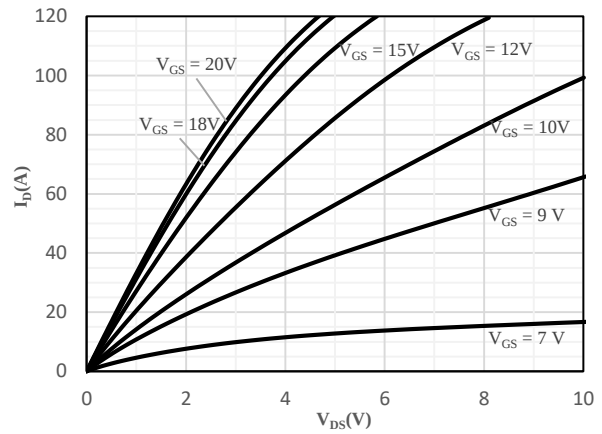


Fig 4 Typical Output Characteristics ($T_j = 25^\circ\text{C}$)

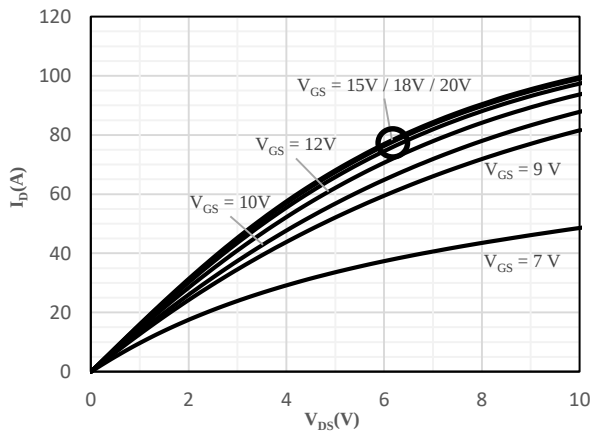


Fig 5 Typical Output Characteristics ($T_j = 175^\circ\text{C}$)

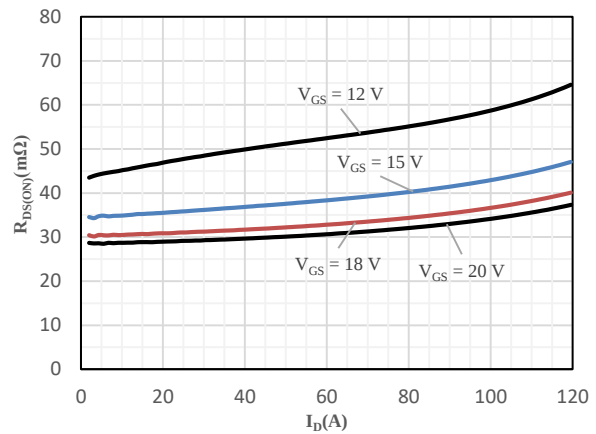


Fig 6 On-Resistance vs. Drain Current

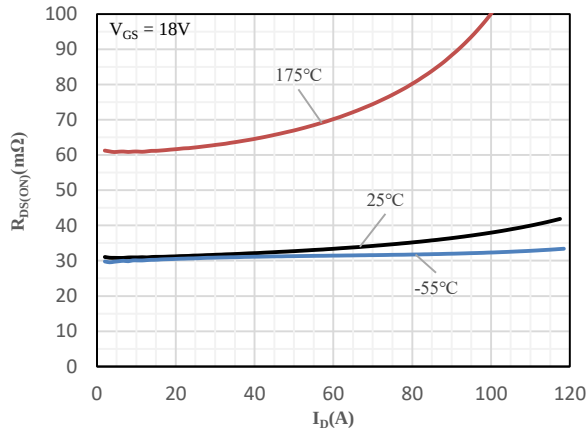


Fig 7 On-Resistance vs. Drain Current
for Various Junction Temperatures

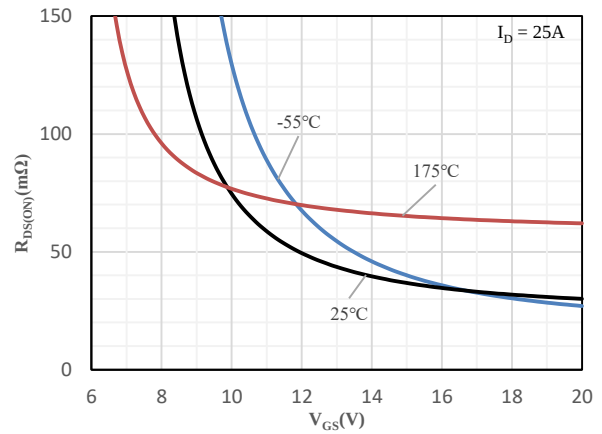


Fig 8 On-Resistance vs. Gate-Source Voltage
for Various Junction Temperatures

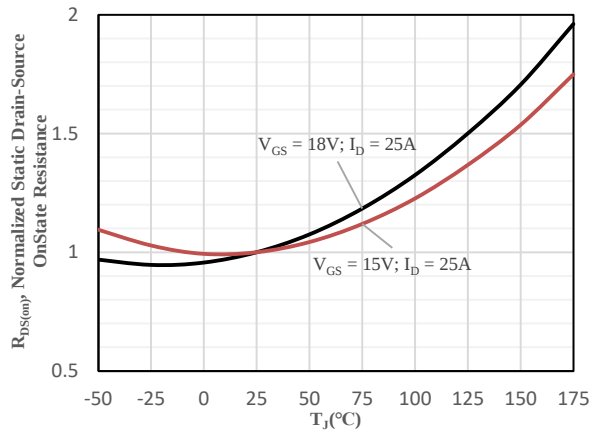


Fig 9 Normalized On-Resistance vs. Junction
Temperature

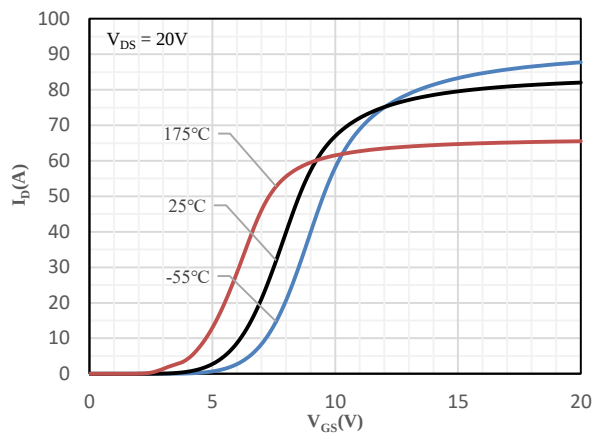


Fig 10 Transfer Characteristics for Various
Junction Temperatures

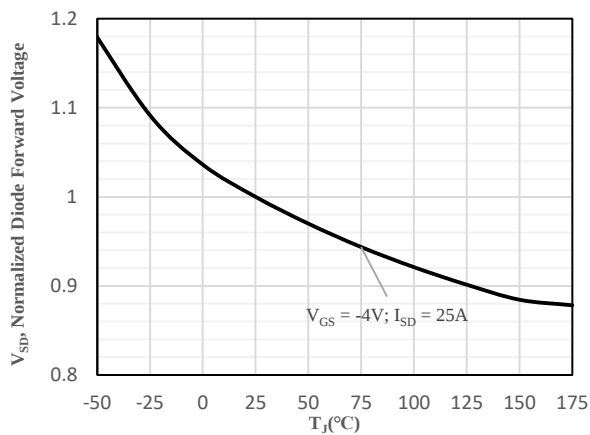


Fig 11 Normalized Diode Forward Voltage vs. Junction
Temperature

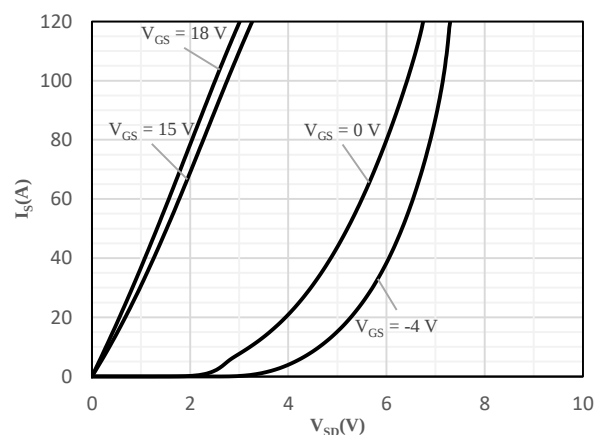


Fig 12 Body-Diode Characteristics ($T_J = -55^\circ\text{C}$)

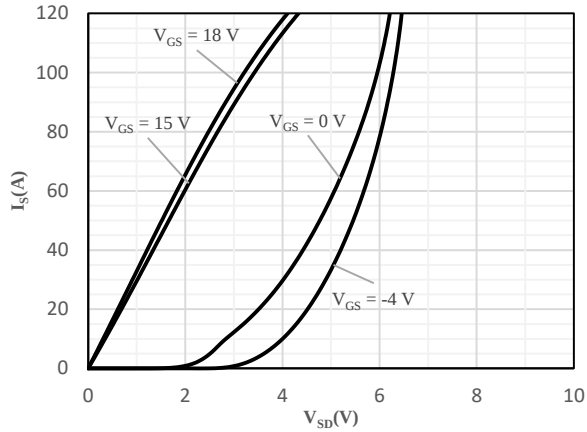


Fig 13 Body-Diode Characteristics ($T_j = 25^\circ\text{C}$)

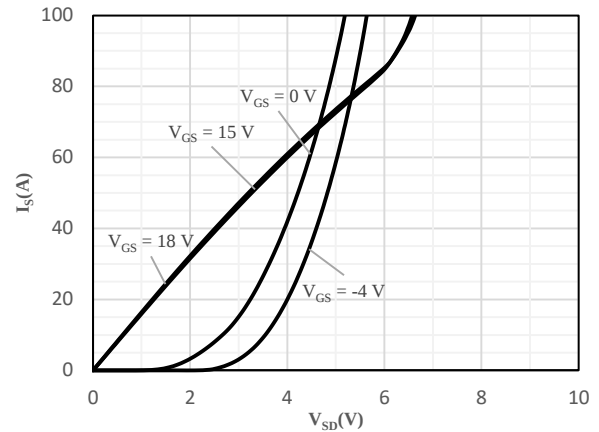


Fig 14 Body-Diode Characteristics ($T_j = 175^\circ\text{C}$)

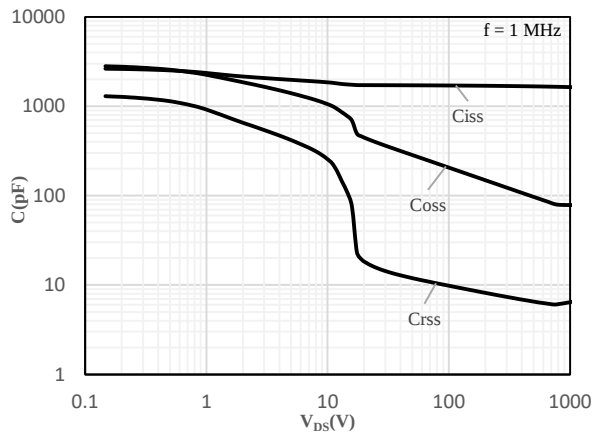


Fig 15 Capacitance Characteristics

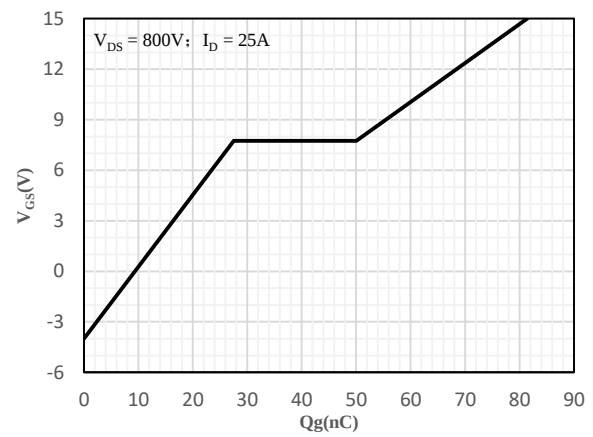


Fig 16 Gate-Charge Characteristics

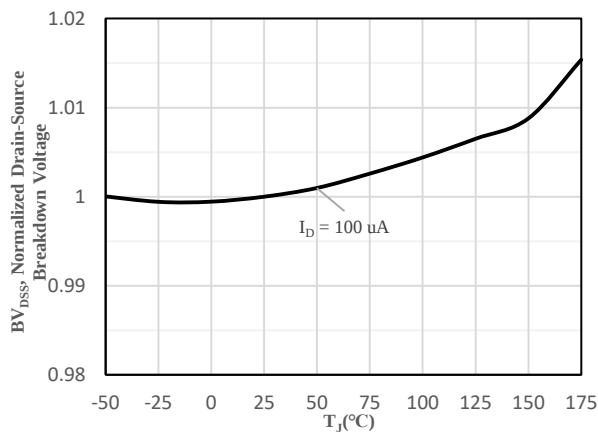


Fig 17 Normalized Breakdown Voltage
vs. Junction Temperature

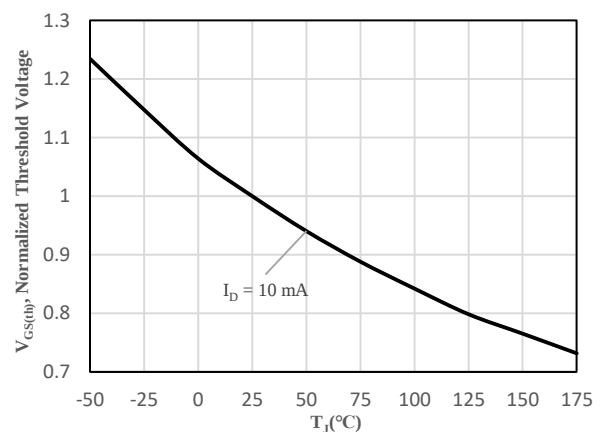


Fig 18 Normalized $V_{GS(th)}$ vs. Junction Temperature

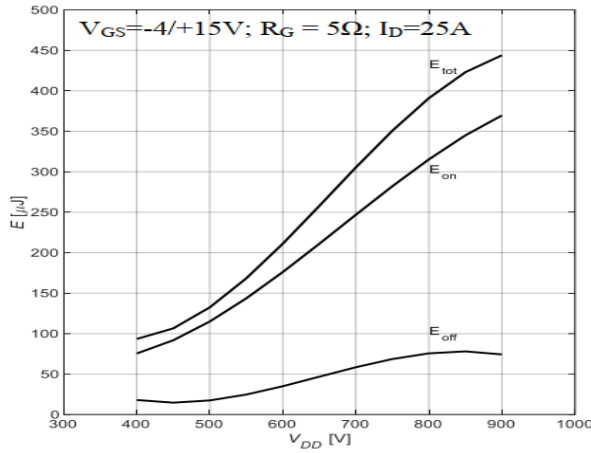


Fig 19 Output Capacitor Stored Energy

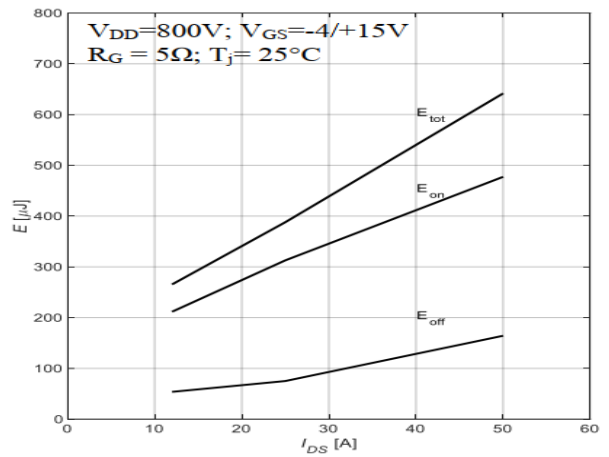


Fig 20 Clamped Inductive Switching Energy vs. Drain Current

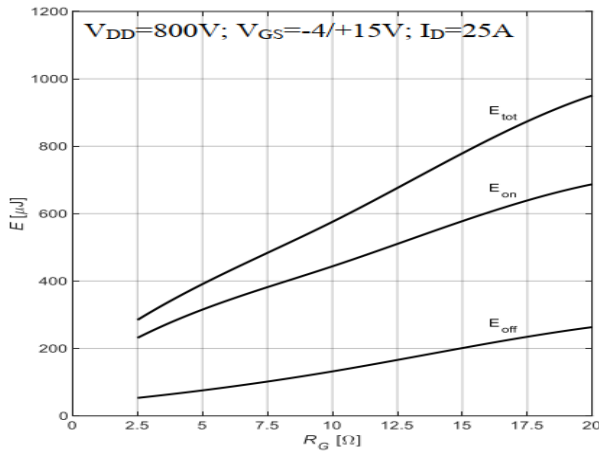


Fig 21 Clamped Inductive Switching Energy vs. R_G

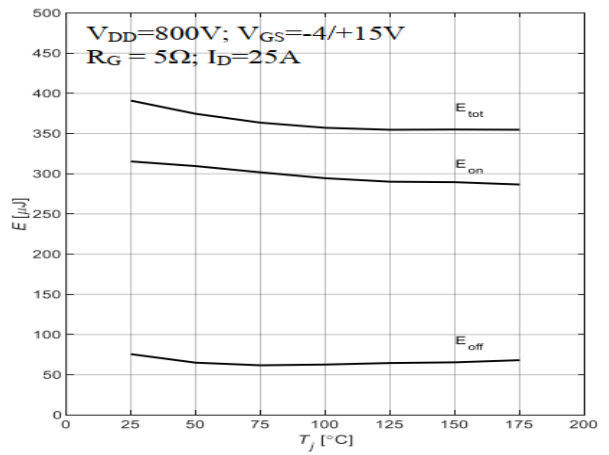


Fig 22 Clamped Inductive Switching Energy vs. T_J

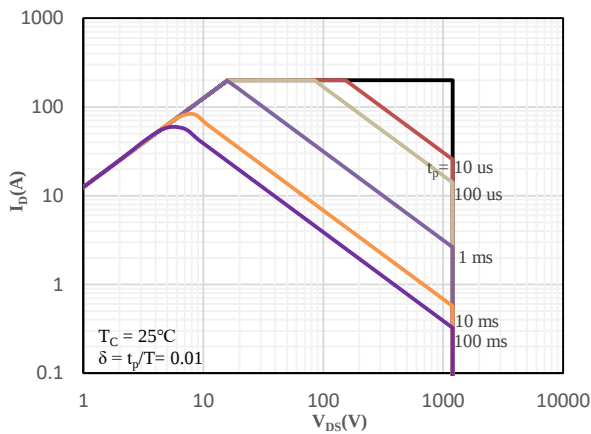


Fig 23 Safe Operating Area

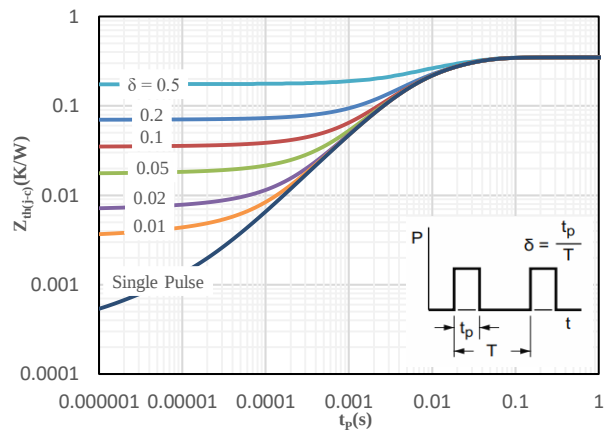
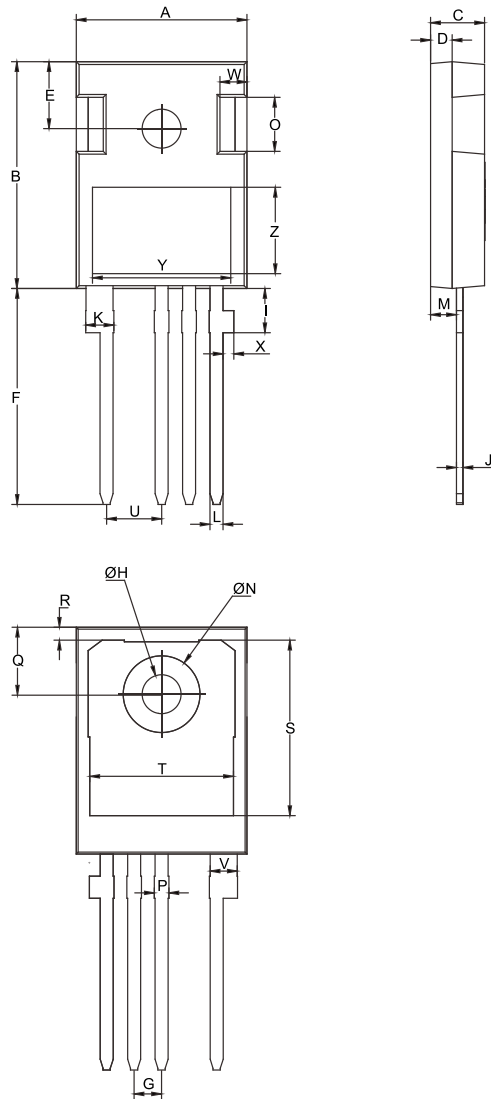


Fig 24 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



TO-247-4L		
Dimension	Min.	Max.
A	15.50	16.10
B	20.70	21.30
C	4.70	5.30
D	1.80	2.20
E	5.40	6.20
F	19.60	20.40
G	2.34	2.74
H	3.40	3.80
I	3.90	4.30
J	0.45	0.75
K	2.40	2.80
L	1.00	1.40
M	2.20	2.60
N	6.90	7.30
O	4.80	5.20
P	1.10	1.60
Q	6.00	6.40
R	1.00	1.40
S	15.90	16.60
T	13.00	13.60
U	4.90	5.30
V	2.30	2.70
W	2.30	2.70
X	0.70	1.10
Y	12.50	13.10
Z	7.70	8.30