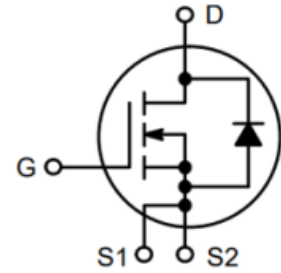


Features

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

HF

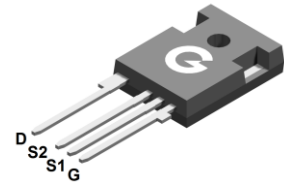


Applications

- Solar inverters
- Charger
- Uninterruptible Power Supply
- Switch Mode Power Supplies

Mechanical Data

- Case: TO-247-4L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-247-4L

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GSC65R040U4	TO-247-4L	30 pcs / Tube	GSC65R040U4

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	650	V
Gate-to-Source Voltage (transient)	V _{GSS}	-8/+22	V
Gate-to-Source Voltage (static)		-4/+18	V
Continuous Drain Current (T _C = 25°C)	I _D	77	A
Continuous Drain Current (T _C = 100°C)		55	A
Pulsed Drain Current	I _{DM}	150	A
Power Dissipation (T _C = 25°C)	P _D	283	W
Operating Junction Temperature Range	T _J	-55 ~ +175	°C
Storage Temperature Range	T _{STG}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	R _{θJC}	-	-	0.53	°C/W
Thermal Resistance Junction-to-Air	R _{θJA}	-	-	50	°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	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650V, V _{GS} = 0V	-	-	10	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = 18V, V _{DS} = 0V	-	-	250	nA
		V _{GS} = -4V, V _{DS} = 0V	-	-	-250	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *1	V _{GS} = 18V, I _D = 30A, T _J = 25°C	-	33	50	mΩ
		V _{GS} = 18V, I _D = 30A, T _J = 175°C	-	35	-	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 10mA	2	-	4	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	1.6	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 600V f = 1MHz	-	2200	-	pF
C _{OSS}	Output Capacitance		-	196	-	
C _{RSS}	Reverse Transfer Capacitance		-	12	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *2	V _{DD} = 400V V _{GS} = -4/18V I _D = 30A R _G = 2.5Ω	-	15	-	ns
t _r	Turn-on Rise Time *2		-	25	-	
t _{d(OFF)}	Turn-Off Delay Time *2		-	23	-	
t _f	Turn-Off Fall Time *2		-	8	-	
E _{on}	Turn-On Energy *2		-	129	-	μJ
E _{off}	Turn-Off Energy *2		-	66	-	
Q _G	Total Gate-Charge	V _{DD} = 400V	-	105	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = -4/18V	-	28	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = 30A	-	30	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *1	I _{SD} = 30A, V _{GS} = -4V, T _J = 25°C	-	5.4	-	V
		I _{SD} = 30A, V _{GS} = -4V, T _J = 175°C	-	4.8	-	
t _{rr}	Reverse Recovery Time	I _F = 30A, V _R = 400V	-	22	-	ns
Q _{rr}	Reverse Recovery Charge	dI/dt = 1002A/μs	-	123	-	nC

Notes:

- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production
- 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)

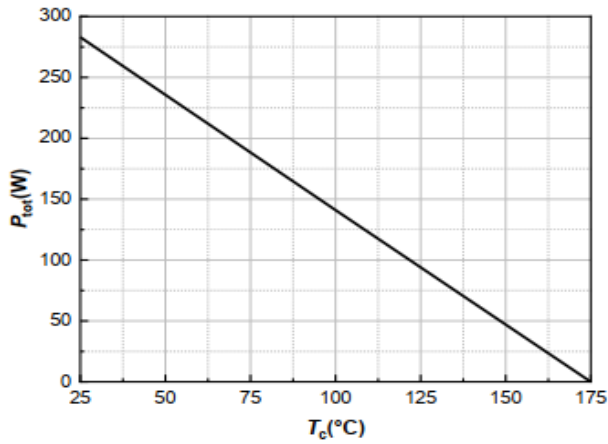


Fig 1 Power Dissipation

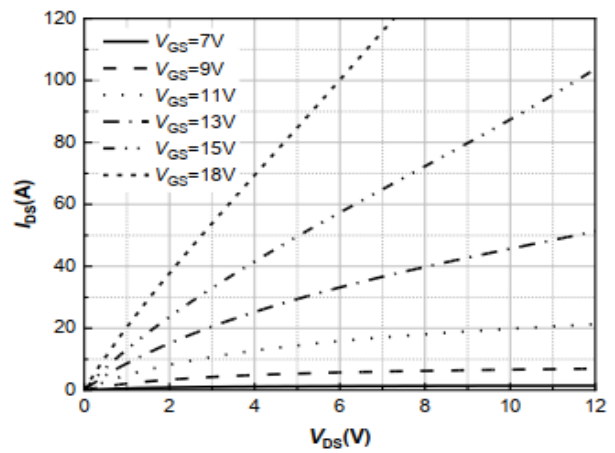


Fig 2 Typical Output Characteristics ($T_j = -40^\circ\text{C}$)

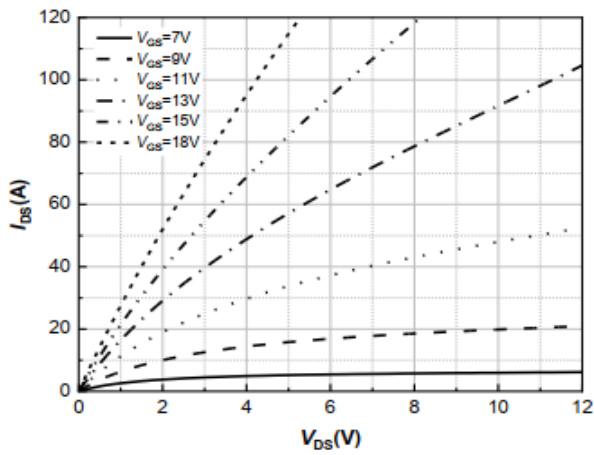


Fig 3 Typical Output Characteristics ($T_j = 25^\circ\text{C}$)

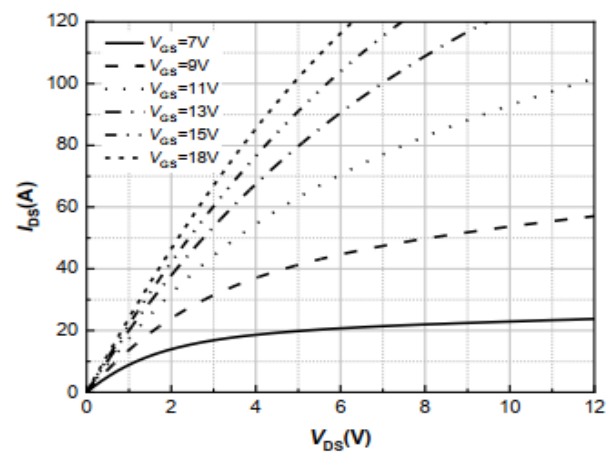


Fig 4 Typical Output Characteristics ($T_j = 175^\circ\text{C}$)

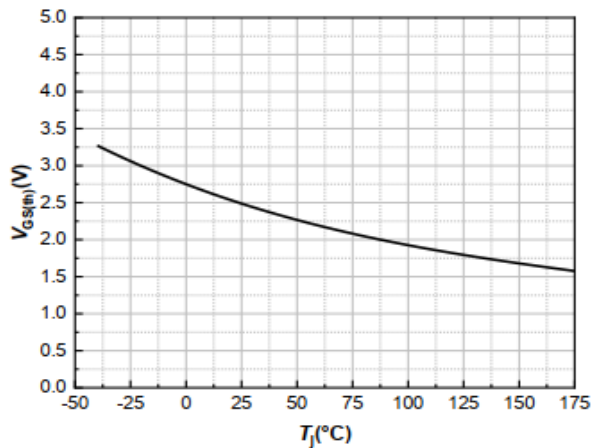


Fig 5 $V_{GS(th)}$ vs. Junction Temperature

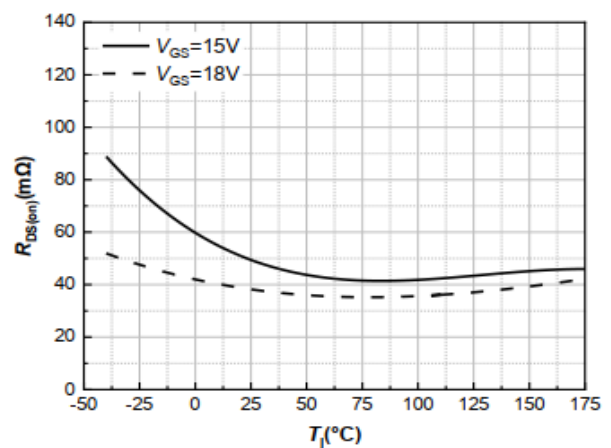


Fig 6 On-Resistance vs. Junction Temperature

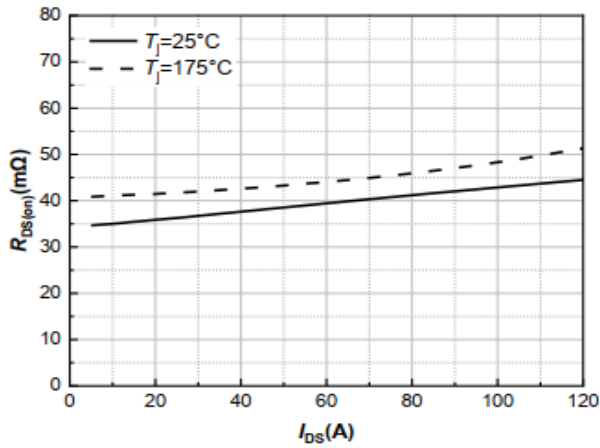


Fig 7 On-Resistance vs. Drain Current

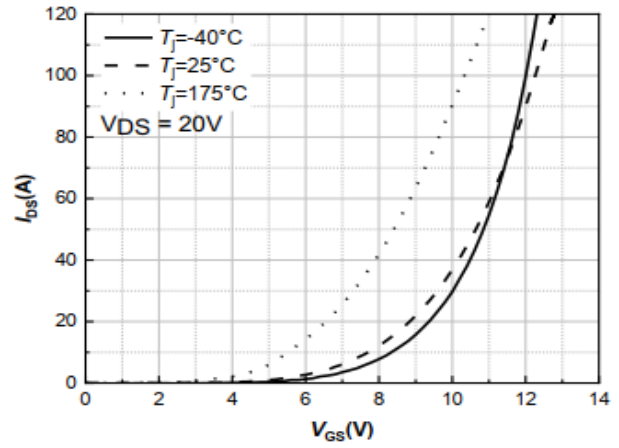


Fig 8 Transfer Characteristics

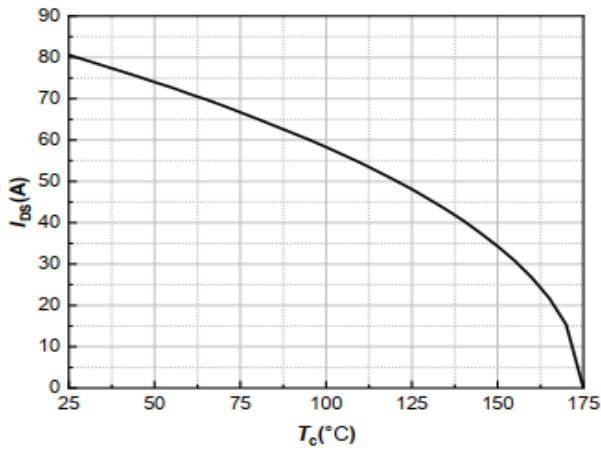


Fig 9 Drain Current

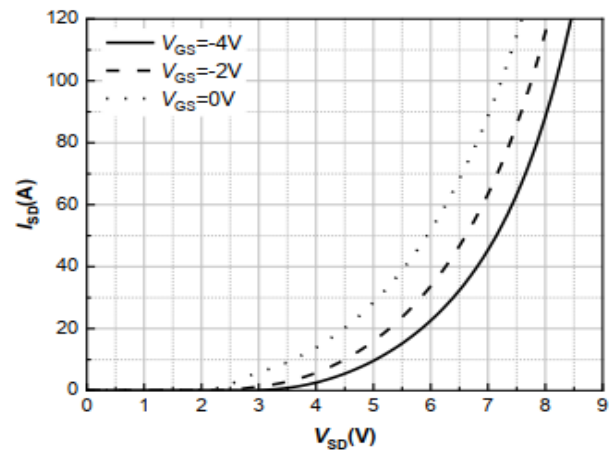


Fig 10 Body-Diode Characteristics ($T_J = -40^\circ\text{C}$)

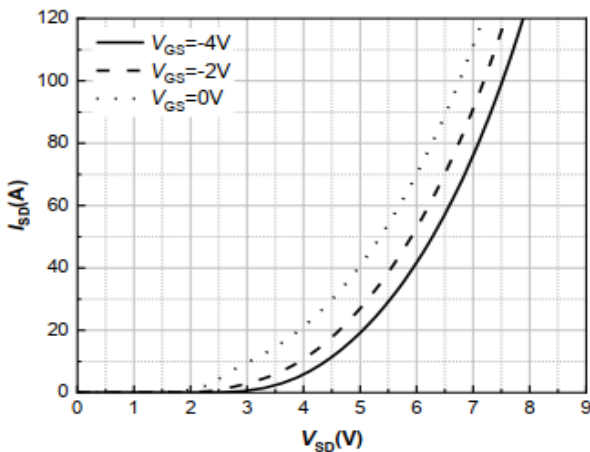


Fig 11 Body-Diode Characteristics ($T_J = 25^\circ\text{C}$)

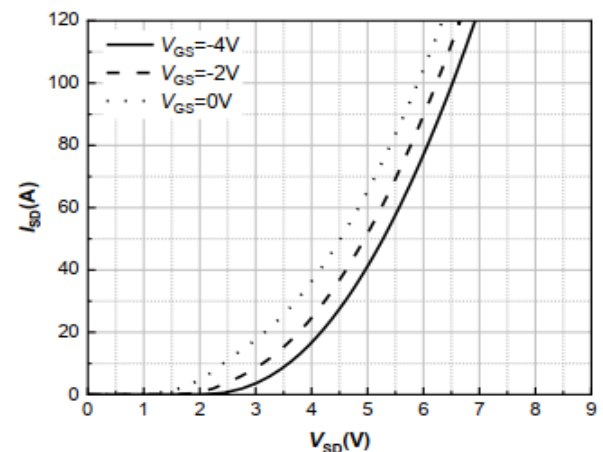


Fig 12 Body-Diode Characteristics ($T_J = 175^\circ\text{C}$)

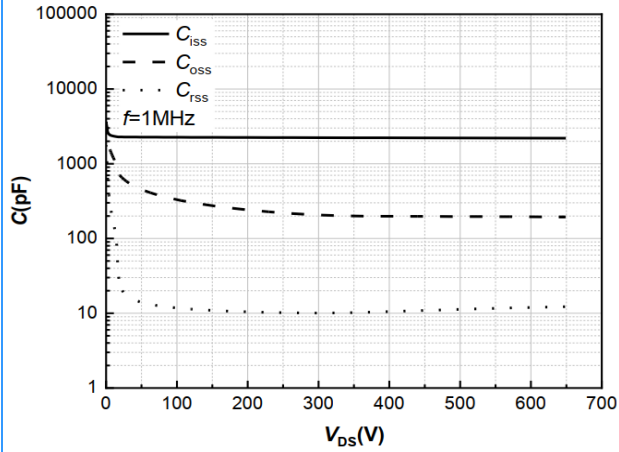


Fig 13 Capacitance Characteristics

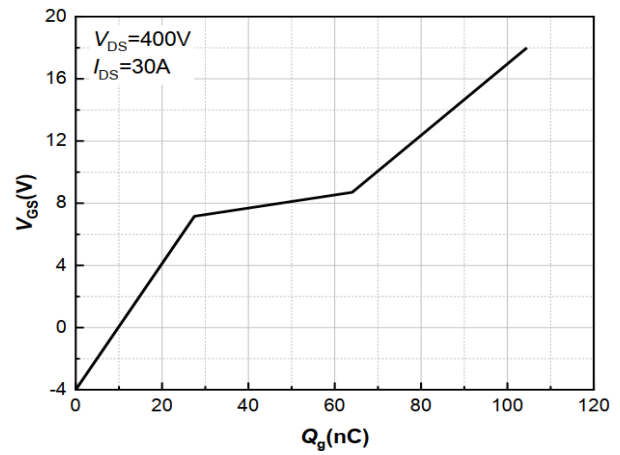


Fig 14 Gate-Charge Characteristics

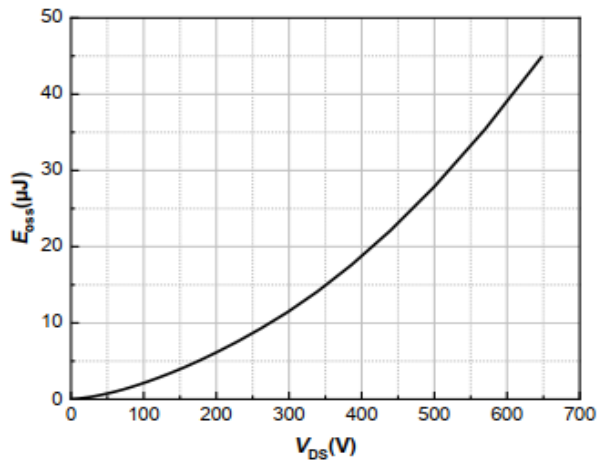


Fig 15 Output Capacitor Stored Energy

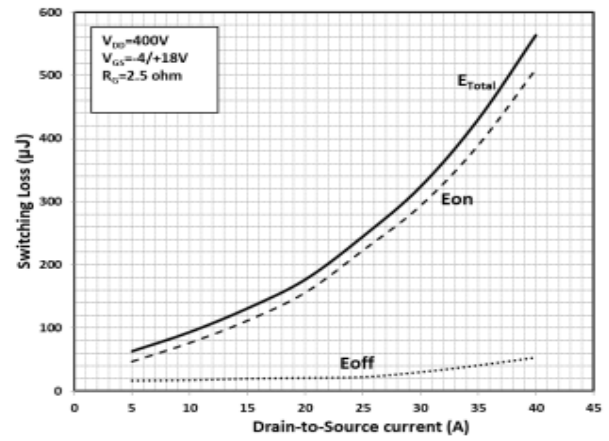


Fig 16 Clamped Inductive Switching Energy vs.
Drain Current

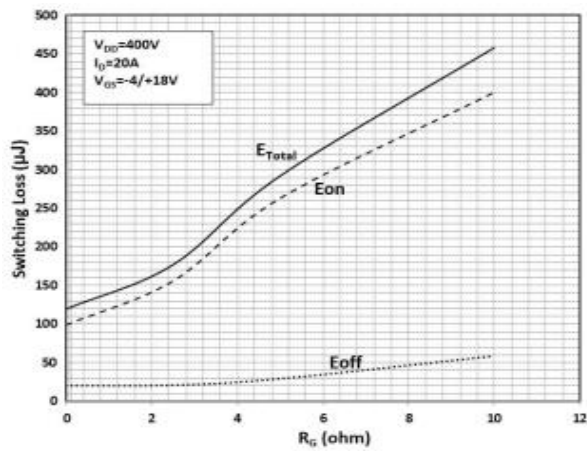


Fig 17 Clamped Inductive Switching Energy vs. R_G

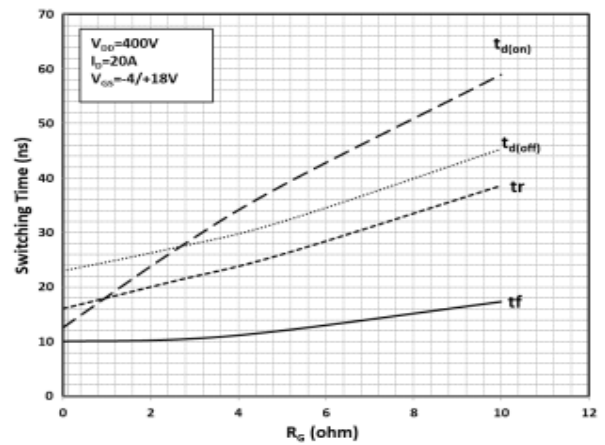


Fig 18 Switching Times vs. R_G

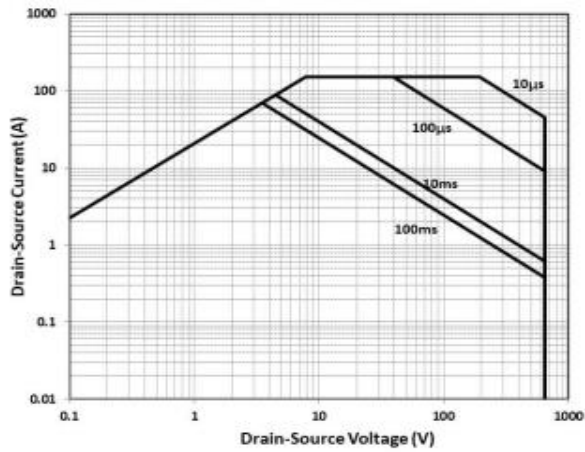


Fig 19 Safe Operating Area

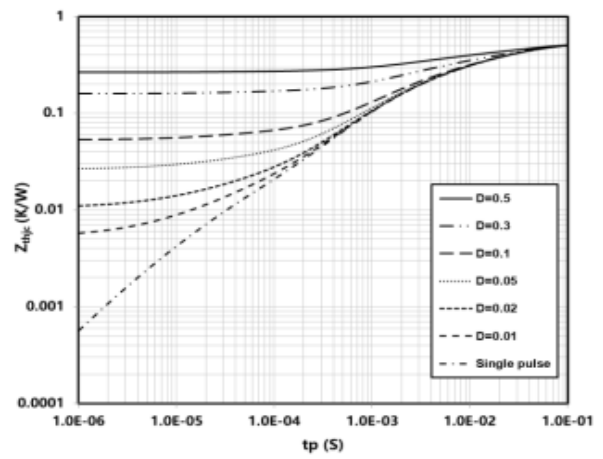
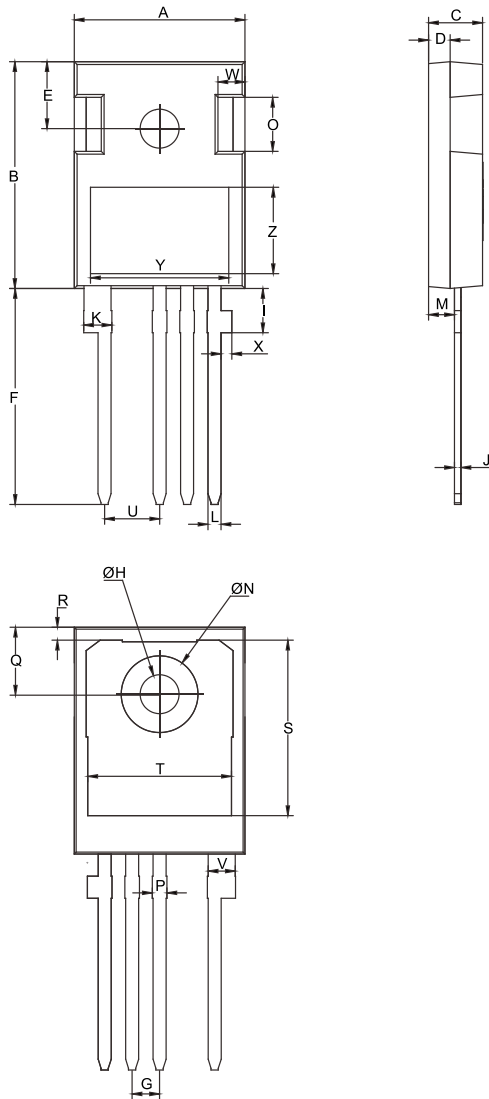


Fig 20 Maximum transient thermal impedance

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