

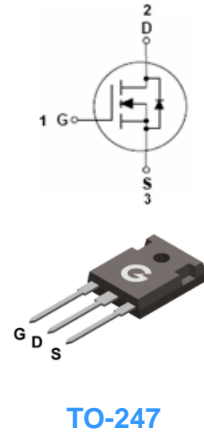
### Features

- Fast switching
- Low  $R_{DS(ON)}$
- Low gate charge
- Low Reverse transfer capacitances

HF

### Mechanical Data

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



### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL20N50U	TO-247	30 pcs / Tube	20N50U

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	500	V
Gate-to-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )	$I_D$	20	A
Continuous Drain Current ( $T_C = 100^\circ\text{C}$ )		12.5	A
Pulsed Drain Current ( $t_p = 10\mu\text{s}$ , $T_C = 25^\circ\text{C}$ )	$I_{DM}$	80	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	1000	mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	250	W
Operating Junction Temperature Range	$T_J$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	0.5	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	-	-	40	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$V_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$R_{DS(ON)}$	Drain-Source On-resistance <sup>*1</sup>	$V_{GS} = 10V, I_D = 10A$	-	-	0.3	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{GS} = 0V$	-	2919	-	pF
$C_{OSS}$	Output Capacitance	$V_{DS} = 25V$	-	277	-	
$C_{RSS}$	Reverse Transfer Capacitance	$f = 1.0MHz$	-	16	-	
<b>Switching Characteristics</b>						
$t_{d(ON)}$	Turn-on Delay Time <sup>*3</sup>	$V_{DD} = 250V$ $I_D = 20A$ $R_G = 10\Omega$	-	34	-	ns
$t_r$	Turn-on Rise Time <sup>*3</sup>		-	65	-	
$t_{d(OFF)}$	Turn-Off Delay Time <sup>*3</sup>		-	82	-	
$t_f$	Turn-Off Fall Time <sup>*3</sup>		-	45	-	
$Q_G$	Total Gate-Charge	$V_{DD} = 400V$	-	52	-	nC
$Q_{GS}$	Gate to Source Charge	$V_{GS} = 10V$	-	13	-	
$Q_{GD}$	Gate to Drain (Miller) Charge	$I_D = 20A$	-	19	-	
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage <sup>*1</sup>	$I_{SD} = 20A, V_{GS} = 0V$	-	-	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_S = 20A, V_{GS} = 0V$	-	535	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 100A/\mu s$	-	5.7	-	$\mu C$

Notes:

1. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
2. The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD} = 100V, V_{GS} = 15V, L = 10mH$
3. Guaranteed by design, not subject to production testing

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

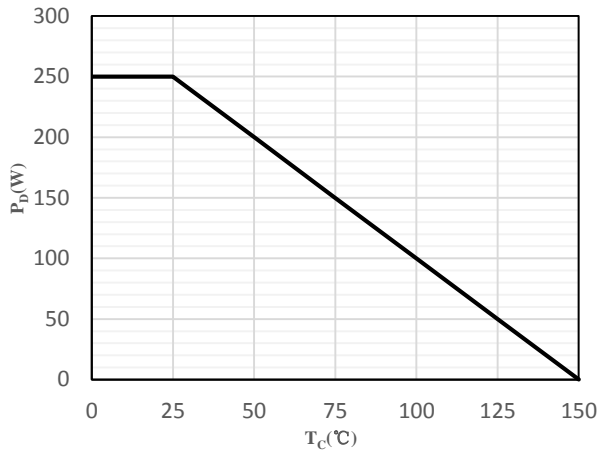


Fig 1 Power Dissipation

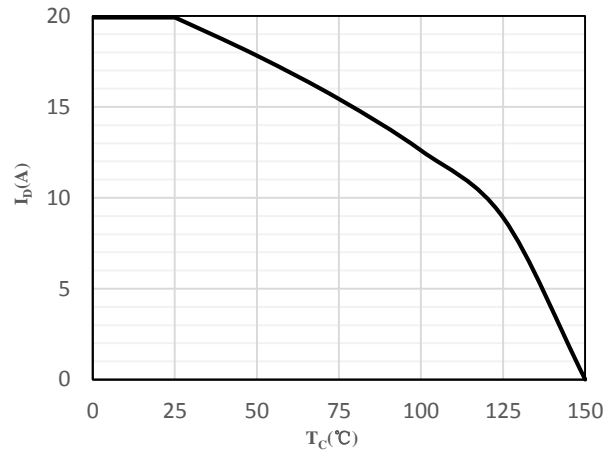


Fig 2 Drain Current

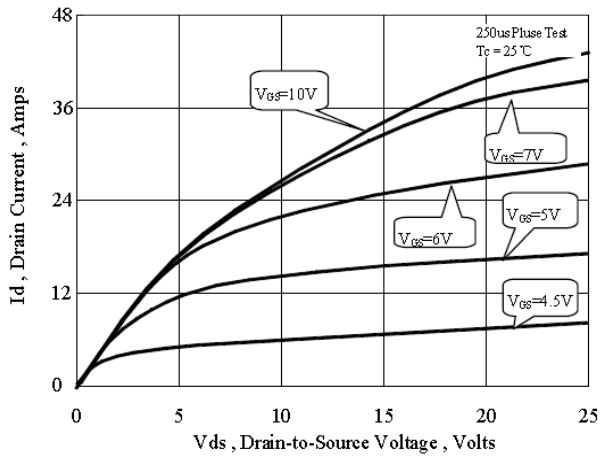


Fig 3 Typical Output Characteristics

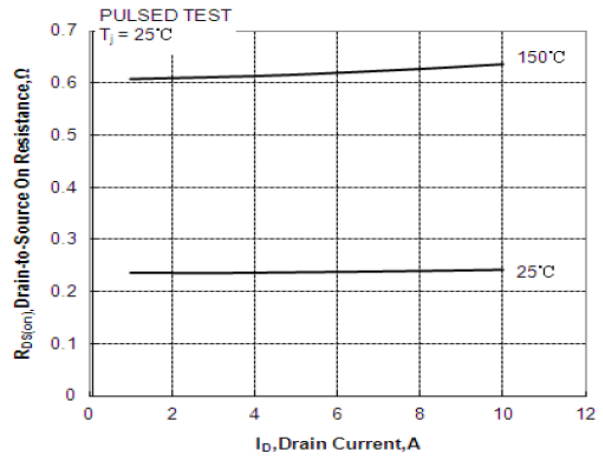


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

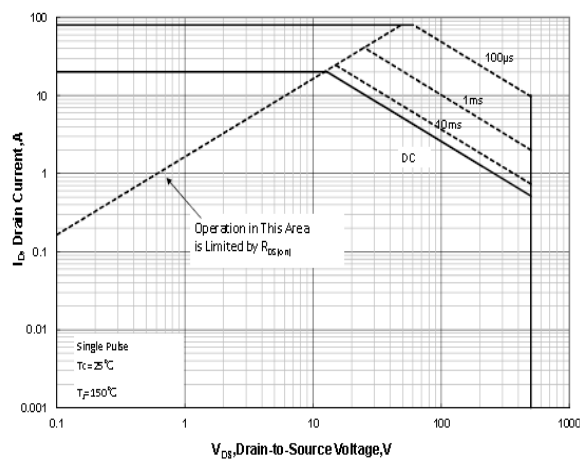


Fig 5 Safe Operation Area

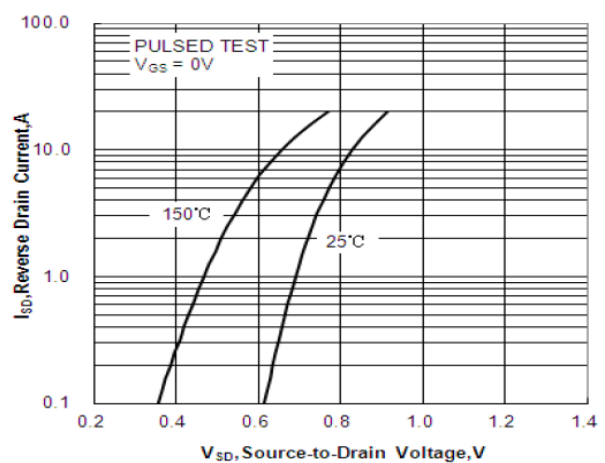


Fig 6 Body-Diode Characteristics

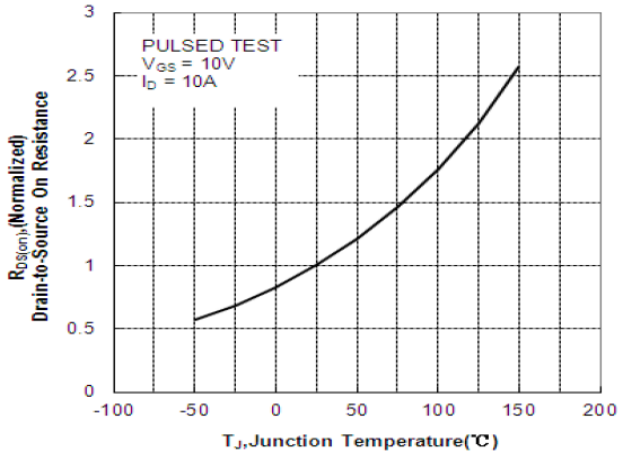


Fig 7 Normalized On-Resistance vs. Junction Temperature

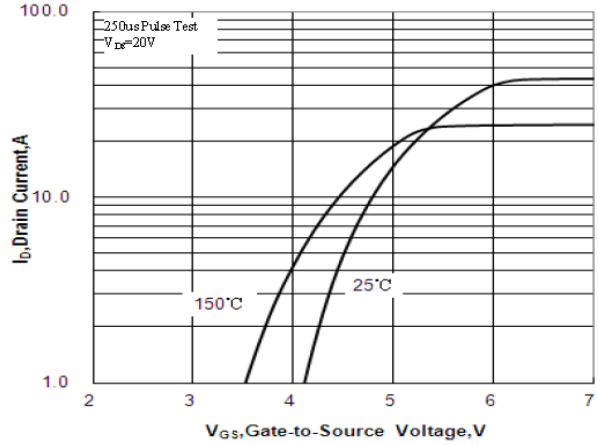


Fig 8 Transfer Characteristics

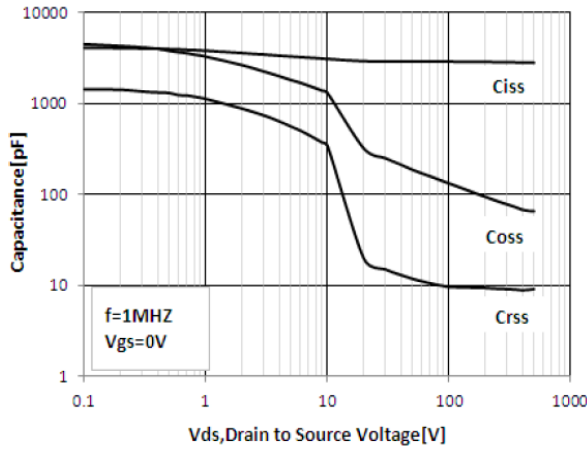


Fig 9 Capacitance Characteristics

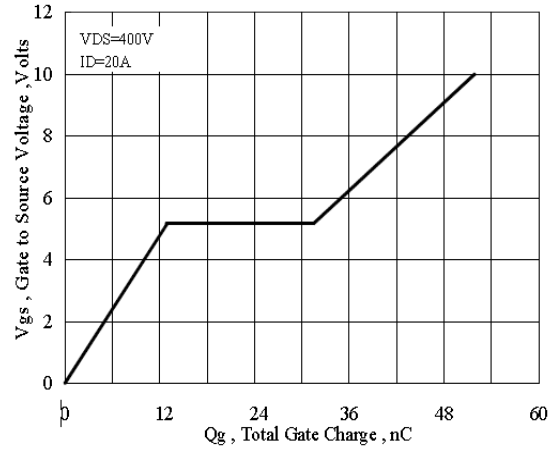


Fig 10 Gate-Charge Characteristics

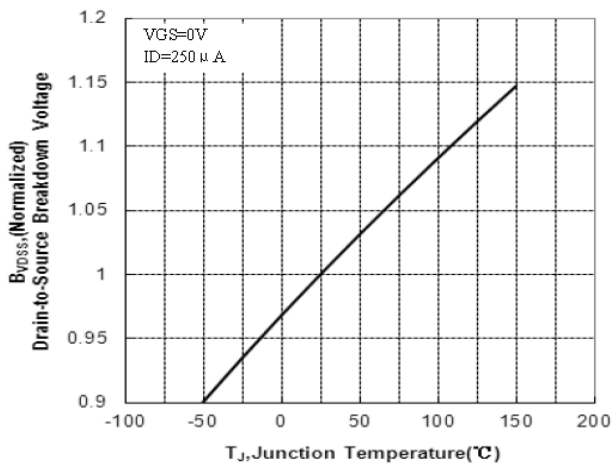


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

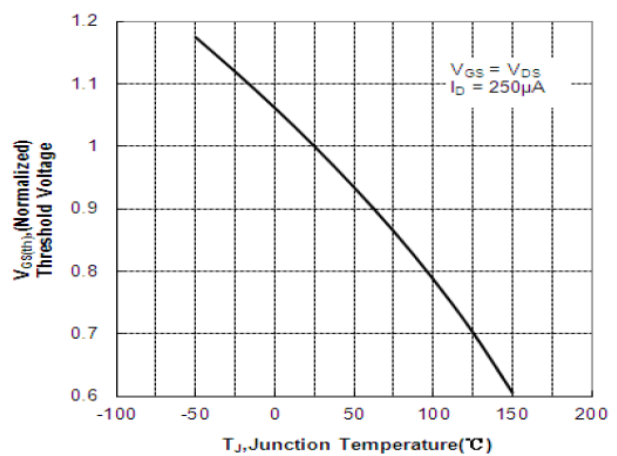
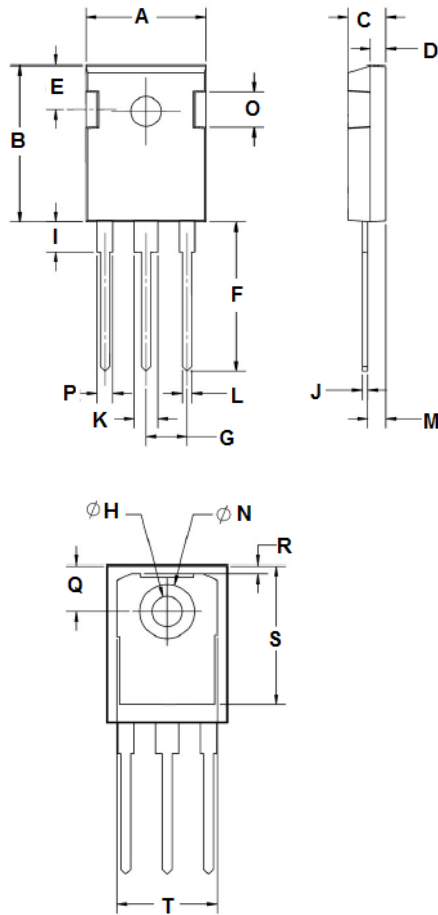


Fig 12 Normalized  $V_{GS(th)}$  vs. Junction Temperature

**Package Outline Dimensions** (Unit: mm)



TO-247		
Dimension	Min.	Max.
A	15.50	16.10
B	20.70	21.30
C	4.70	5.30
D	1.80	2.20
E	5.20	5.80
F	19.70	20.30
G	5.20	5.60
H	3.30	3.70
I	3.90	4.30
J	0.50	0.70
K	2.80	3.20
L	1.00	1.40
M	2.20	2.60
N	7.00	7.20
O	4.90	5.30
P	1.80	2.20
Q	5.70	5.90
R	0.80	1.20
S	17.00	17.80
T	13.60	14.20

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