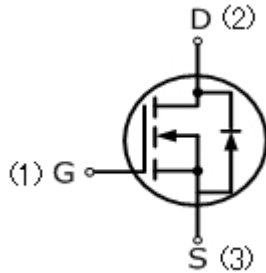


## 20N65Y

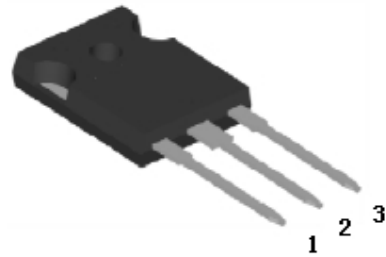
### 20 Amps, 650 Volts N-CHANNEL MOSFET

#### FEATURE

- 20A, 650V,  $R_{DS(ON)MAX}=0.50\ \Omega @V_{GS}=10V/10A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



#### TO-247-3L



#### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	20N65Y	UNIT
Drain-Source Voltage	$V_{DSS}$	650	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	
Continuous Drain Current	$I_D$	20	A
Pulsed Drain Current (Note 1)	$I_{DM}$	80	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	980	mJ
Reverse Diode dV/dt (Note 3)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$

#### Thermal Characteristics

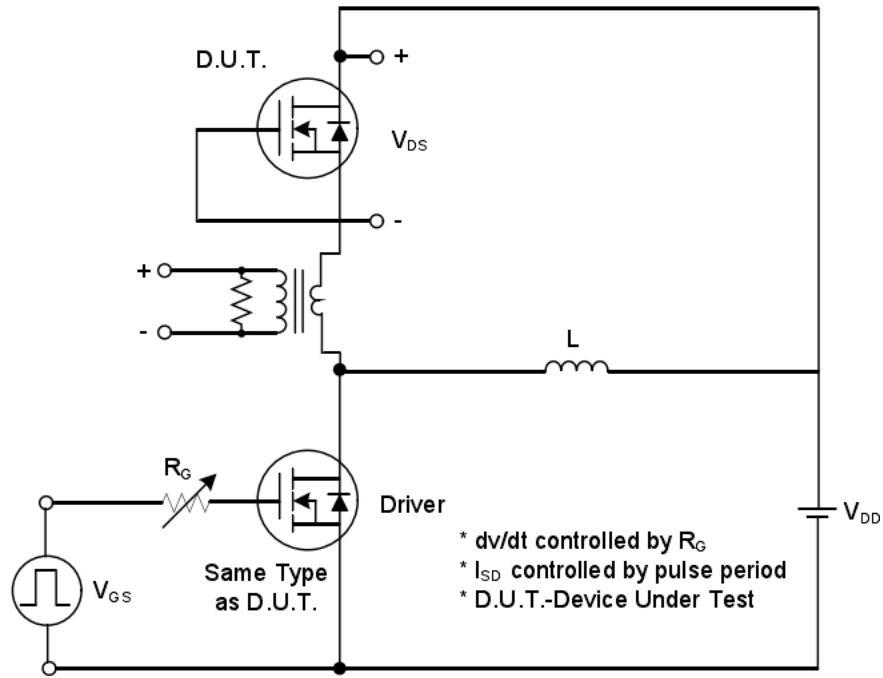
Parameter	Symbol	TO-247-3L	Units
Maximum Junction-to-Case	$R_{thJC}$	0.54	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$P_D$	231	W

<b>Electrical Characteristics</b> ( $T_c=25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	—	—	V
Breakdown Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$	—	0.6	—	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$	—	—	1	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS}=30V, V_{DS}=0V$	—	—	100	nA
Gate-Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS}=-30V, V_{DS}=0V$	—	—	-100	nA
<b>On Characteristics</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	—	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	—	0.42	0.5	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHZ}$	—	2983	—	pF
Output Capacitance	$C_{oss}$		—	316	—	pF
Reverse Transfer Capacitance	$C_{rss}$		—	20	—	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V, I_D=20A,$ $R_G=10\Omega$ (Note3,4)	—	36	—	ns
Turn-On Rise Time	$t_r$		—	74.7	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	78.7	—	ns
Turn-Off Fall Time	$t_f$		—	58.7	—	ns
Total Gate Charge	$Q_g$	$V_{DS}=400V, I_D=20A,$ $V_{GS}=10V$ , (Note3,4)	—	58	—	nC
Gate-Source Charge	$Q_{gs}$		—	13.3	—	nC
Gate-Drain Charge	$Q_{gd}$		—	22.9	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	$I_S$		—	—	20	A
Pulsed Diode Forward Current	$I_{SM}$		—	—	80	A
Diode Forward Voltage	$V_{SD}$	$I_S=20A, V_{GS}=0V$	—	—	1.5	V
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=20A,$ $dI_F/dt=100A/\mu s$ , (Note3)	—	584	—	ns
Reverse Recovery Charge	$Q_{rr}$		—	6.85	—	$\mu C$

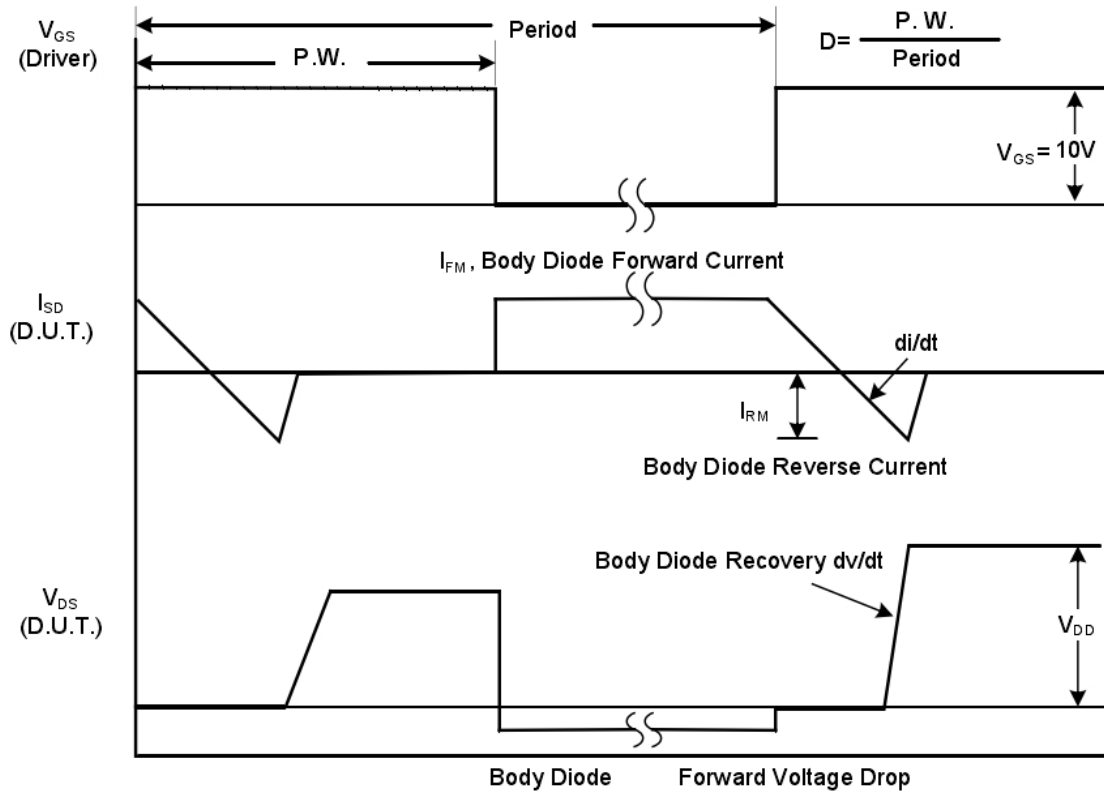
#### Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature.
2.  $V_{DD}=50V, L=10\text{mH}, R_g=25\Omega, I_{AS}=14A$ , starting  $T_J=25^\circ\text{C}$ .
3.  $I_{SD} \leq I_D, dI/dt=200A/\mu s, V_{DD} \leq BV_{DSS}$ , starting  $T_J=25^\circ\text{C}$ , Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
4. Repetitive rating; pulse width limited by maximum junction temperature.

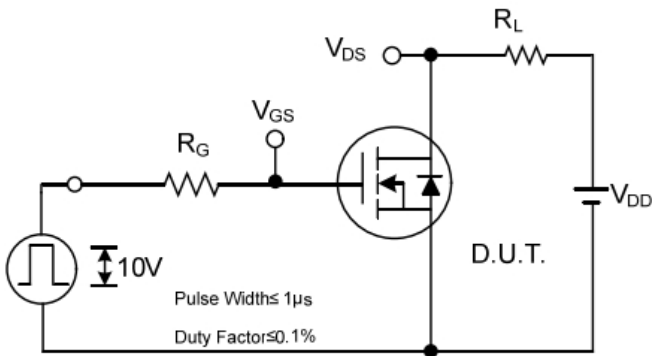
## RATING AND CHARACTERISTIC CURVES



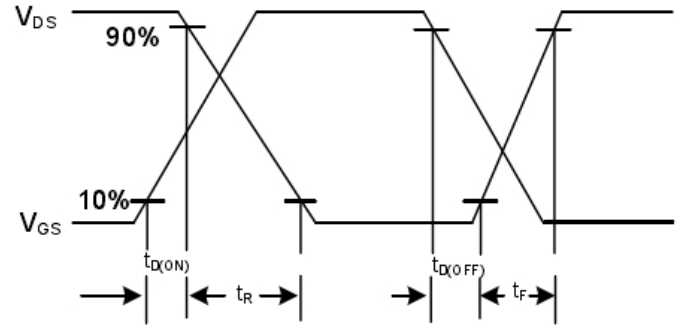
Peak Diode Recovery  $dv/dt$  Test Circuit



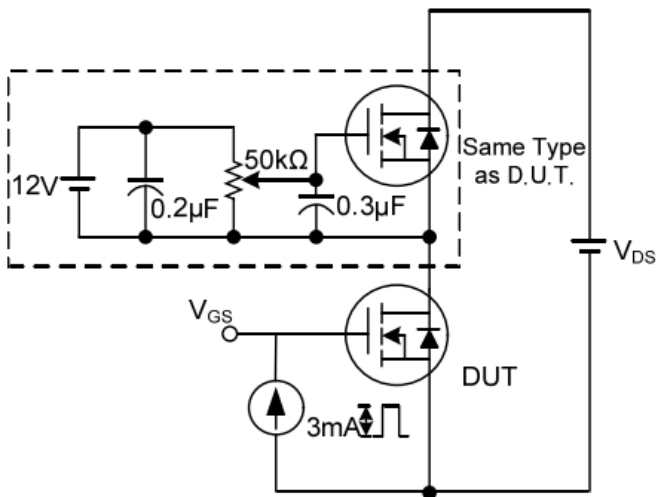
Peak Diode Recovery  $dv/dt$  Waveforms



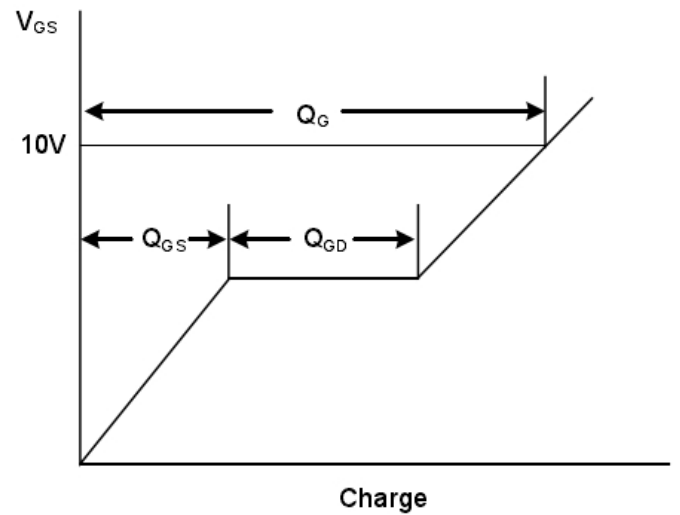
**Switching Test Circuit**



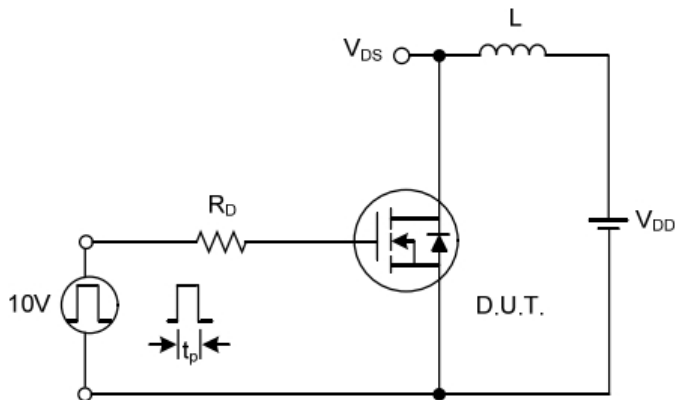
**Switching Waveforms**



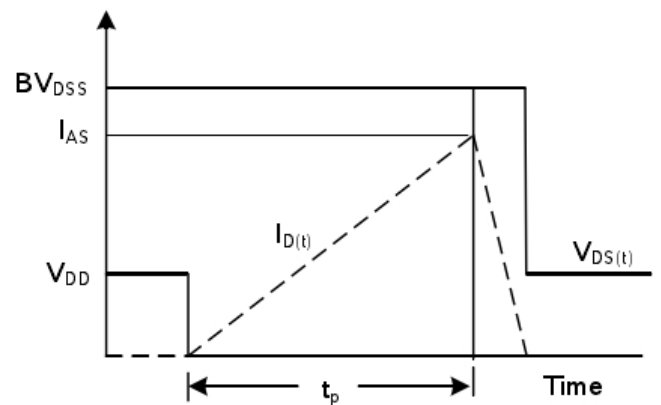
**Gate Charge Test Circuit**



**Gate Charge Waveform**

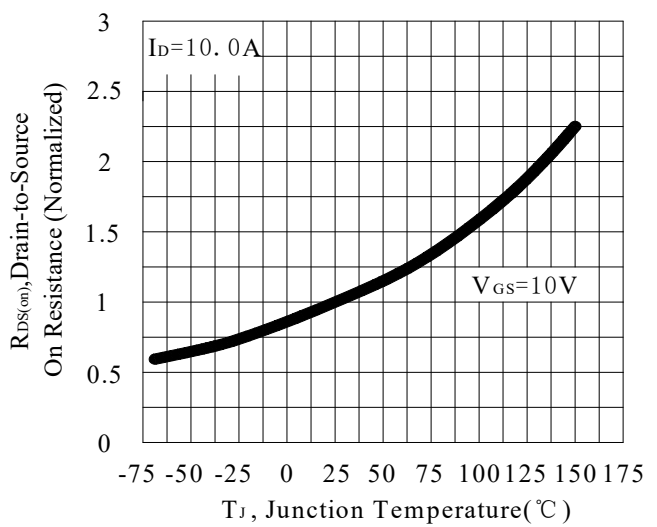
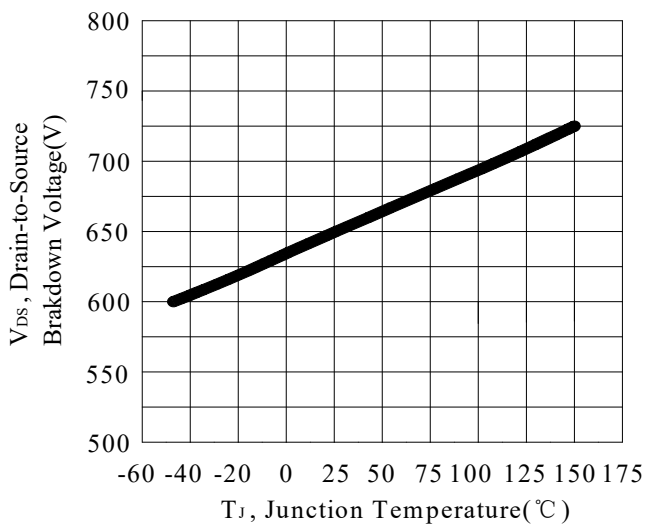
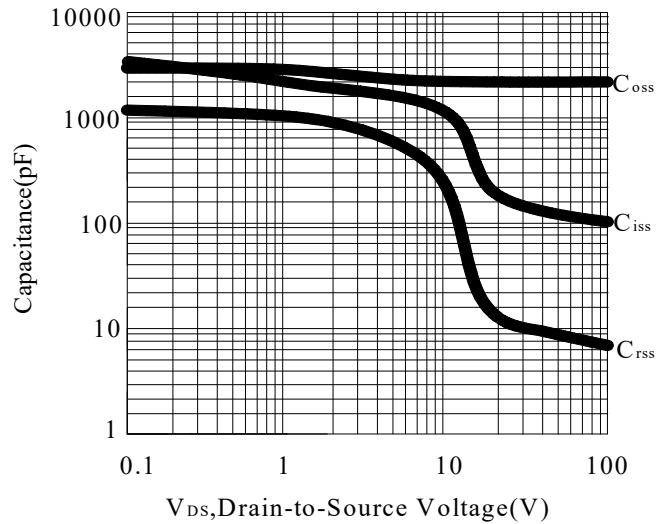
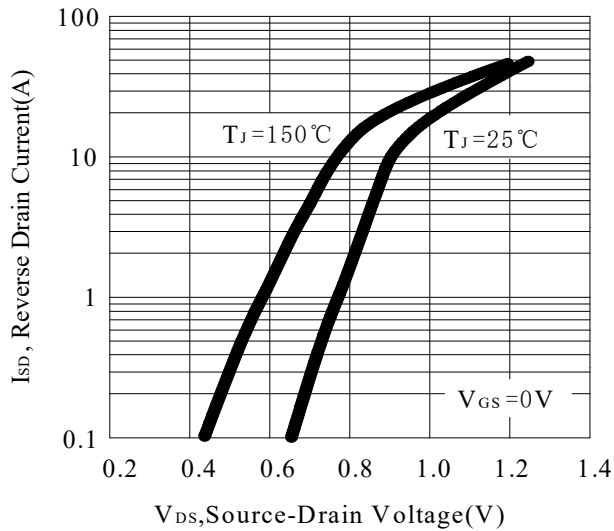
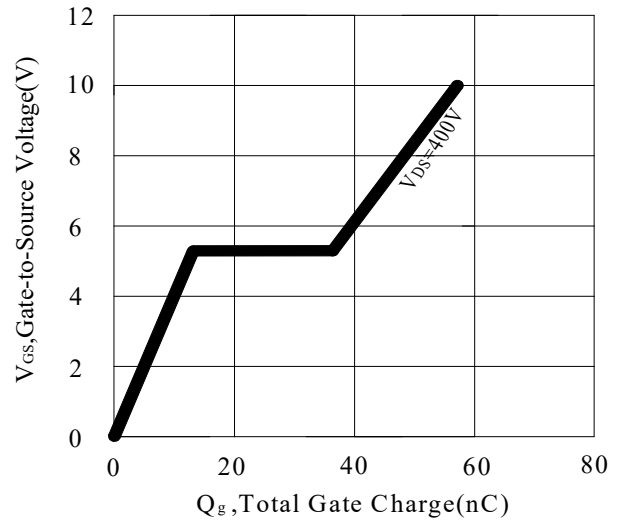
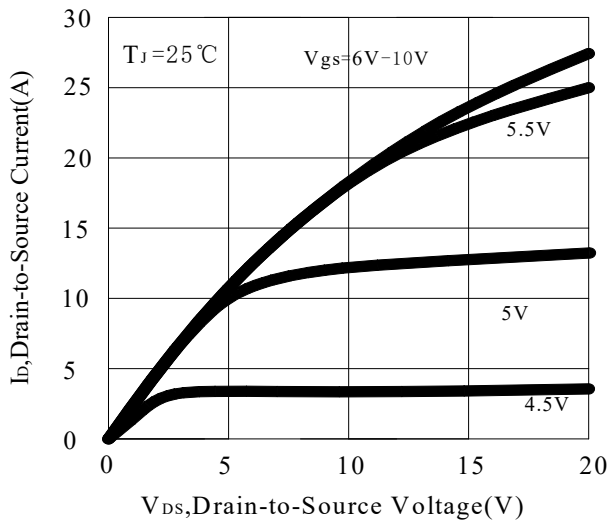


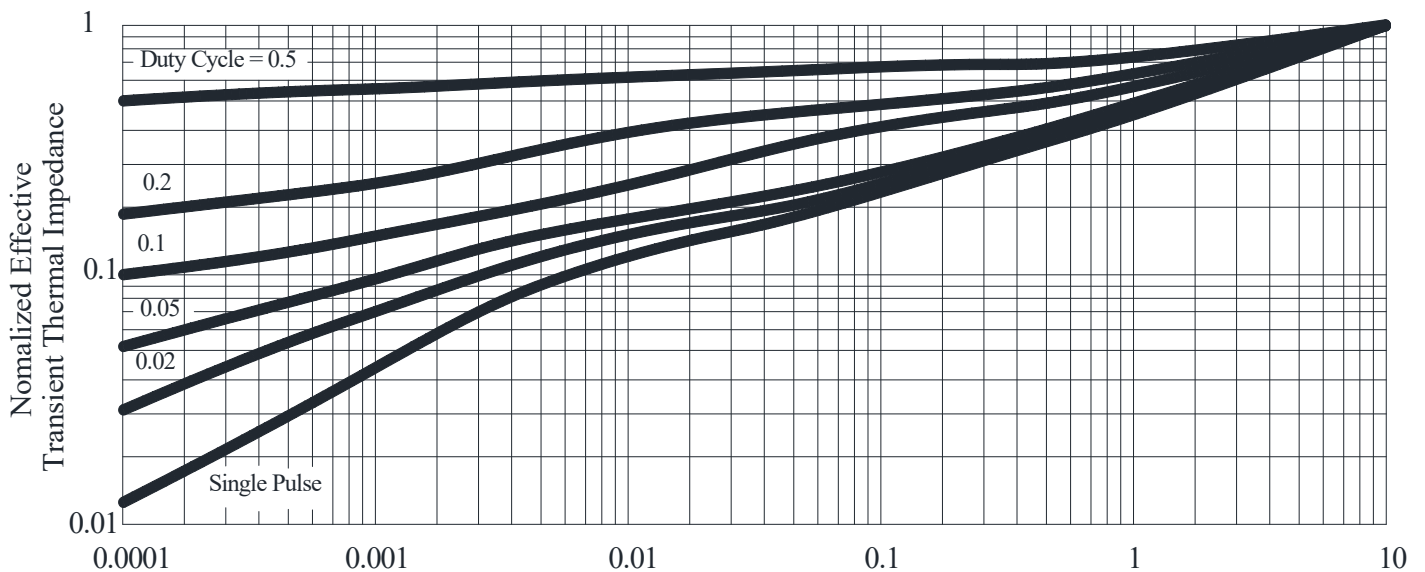
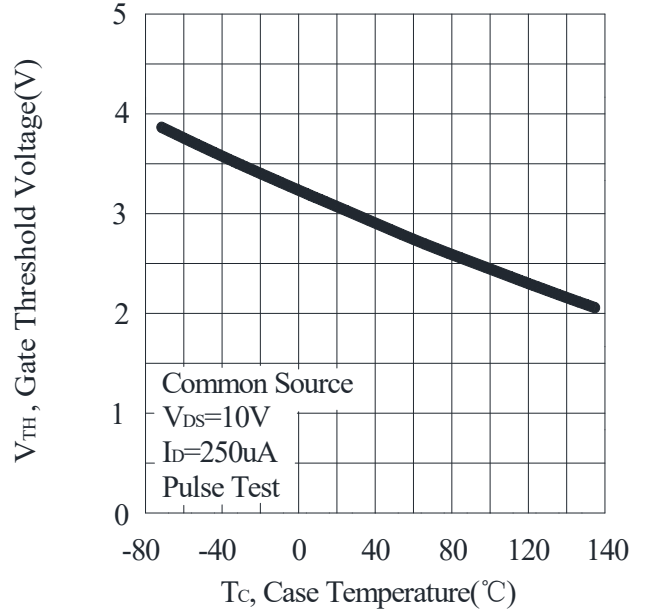
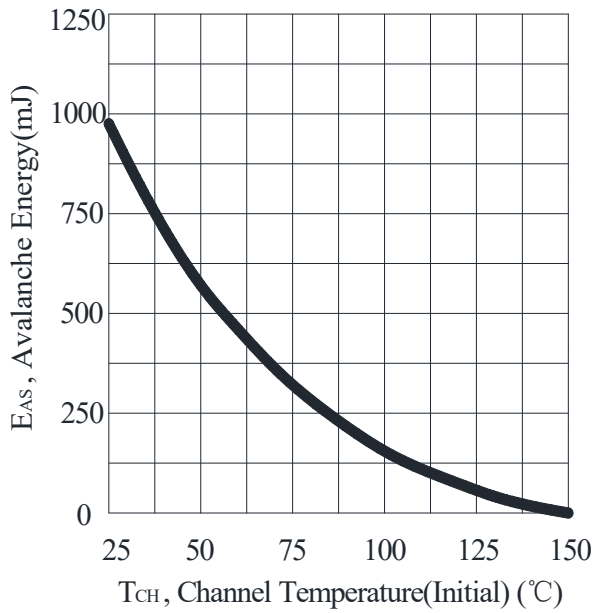
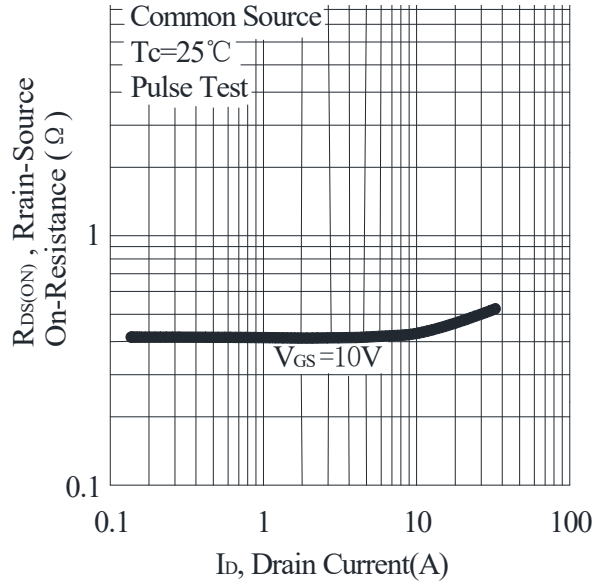
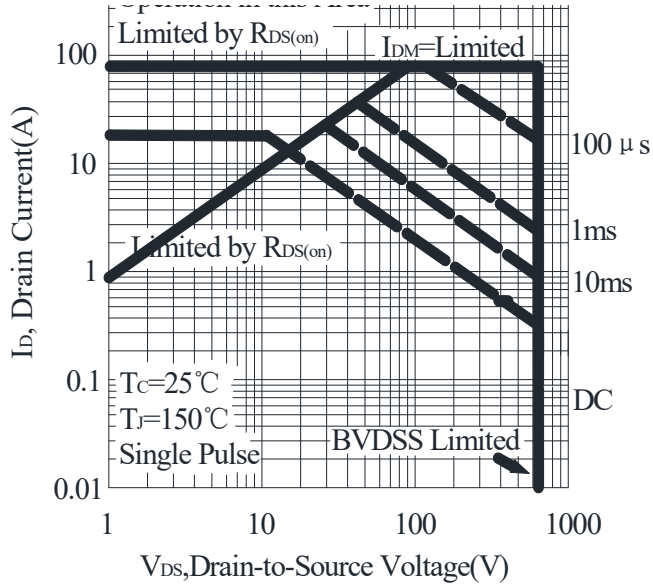
**Unclamped Inductive Switching Test Circuit**



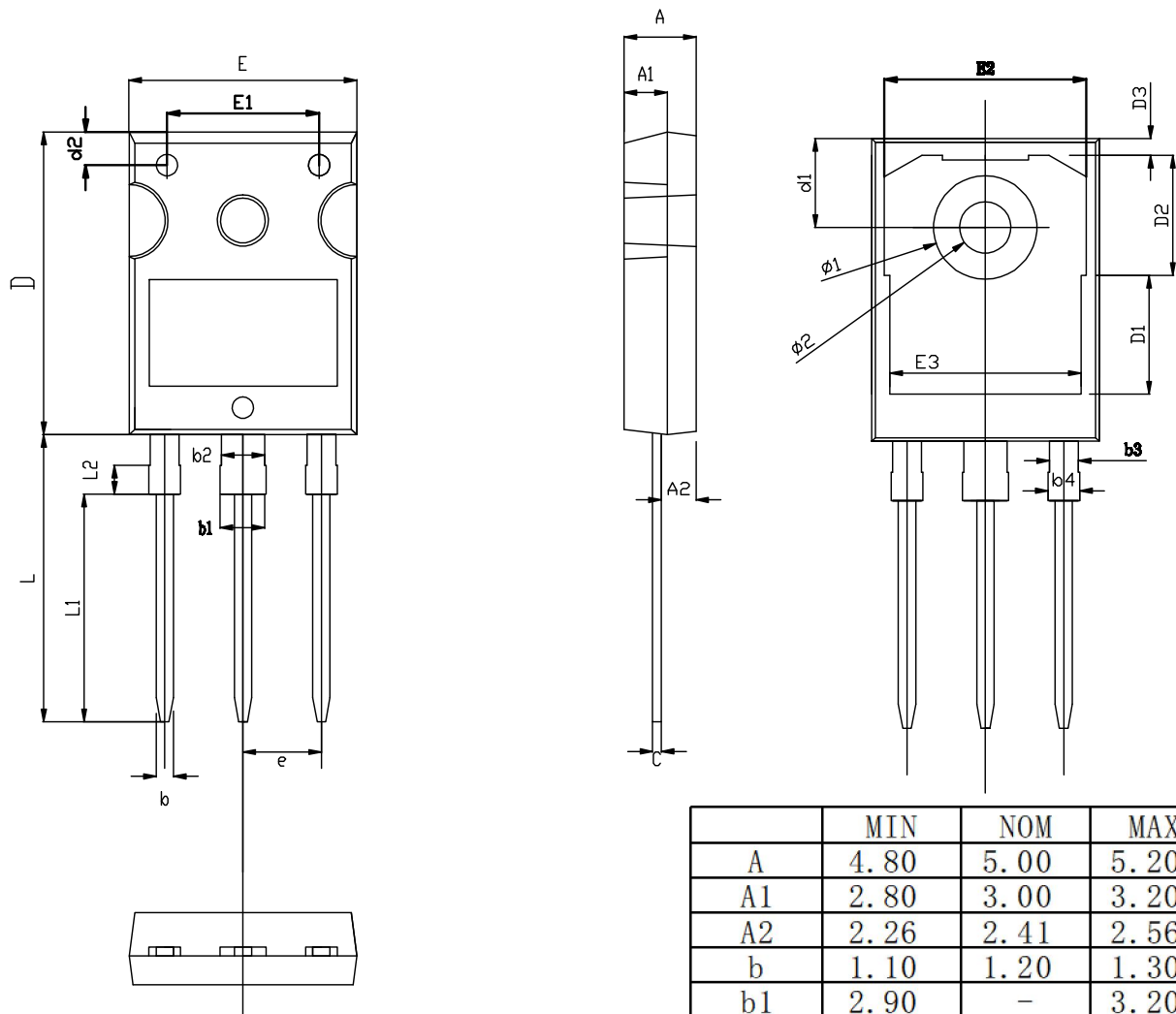
**Unclamped Inductive Switching Waveforms**

## RATING AND CHARACTERISTIC CURVES

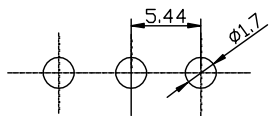




# TO-247-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.80	3.00	3.20
A2	2.26	2.41	2.56
b	1.10	1.20	1.30
b1	2.90	-	3.20
b2	2.90	3.00	3.10
b3	1.90	2.00	2.10
b4	2.00	-	2.20
c	0.50	0.60	0.70
D	20.80	21.00	21.20
D1		8.23	
D2		8.32	
D3		1.17	
d1	6.00	6.15	6.30
d2	2.20	2.30	2.40
E	15.60	15.80	16.00
E1		10.50	
E2		14.02	
E3		13.50	
e	5.34	5.44	5.54
L	19.72	19.92	20.12
L1		15.79	
L2		1.98	
ø1	7.10	7.19	7.30
ø2	3.50	3.60	3.70

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