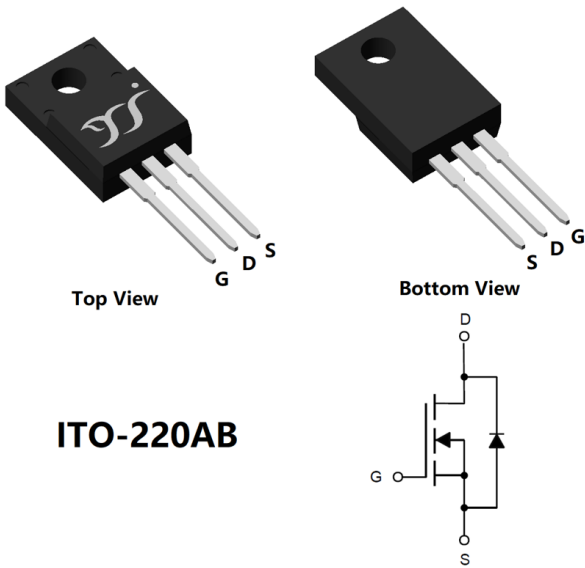


## N-Channel Enhancement Mode Field Effect Transistor



**ITO-220AB**

### Product Summary

- $V_{DS}$  650V
- $I_D$  12A
- $R_{DS(ON)}$  ( at  $V_{GS}=10V$ )  $<0.85\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Low Power Loss by High Speed Switching and Low On-Resistance
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Power switching application
- Adapter
- PFC Power Supply Stages

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	650	V
Gate-source Voltage		$V_{GS}$	$\pm 30$	V
Drain Current	$T_A=25^\circ\text{C}$	$I_D$	0.8	A
	$T_A=100^\circ\text{C}$		0.5	
	$T_C=25^\circ\text{C}$		12	
	$T_C=100^\circ\text{C}$		7.5	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	25	A
Avalanche energy <sup>B</sup>		EAS	693.6	mJ
Total Power Dissipation <sup>C</sup>	$T_A=25^\circ\text{C}$	$P_D$	1.92	W
	$T_A=100^\circ\text{C}$		0.76	
	$T_C=25^\circ\text{C}$		52	
	$T_C=100^\circ\text{C}$		20	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	55	65	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	2	2.4	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJF12N65HX	B1	YJF12N65HX	50	/	5000	Tube



# YJF12N65HX

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.2	3.0	3.8	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =6A	-	0.68	0.85	Ω
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =6A, V <sub>GS</sub> =0V	-	-	1.2	V
Gate resistance	R <sub>G</sub>	f=1MHz	-	3.3	-	Ω
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	12	A
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =325V, V <sub>GS</sub> =0V, f=1MHz	-	2000	-	pF
Output Capacitance	C <sub>oss</sub>		-	40	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	2.2	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =325V, I <sub>D</sub> =12A	-	38.5	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	10.5	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	13.4	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =12A, di/dt=100A/us	-	5.34	-	uC
Reverse Recovery Time	t <sub>rr</sub>		-	407	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =325V, I <sub>D</sub> =12A R <sub>GEN</sub> =2.2Ω	-	27	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	16	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	26	-	
Turn-off fall Time	t <sub>f</sub>		-	10	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T<sub>J</sub>=25°C, V<sub>G</sub>=10V, L=30mH, I<sub>AS</sub>=6.8A.

C. P<sub>d</sub> is based on max. junction temperature, using junction-case and junction-ambient thermal resistance.

D. The value of R<sub>θJA</sub> is measured with the device mounted on the 40mm\*40mm\*1.1mm FR-4 PCB board with 1 in<sup>2</sup> pad of 2oz. Copper, in the still air environment with TA =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



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## ■ Typical Electrical and Thermal Characteristics Diagrams

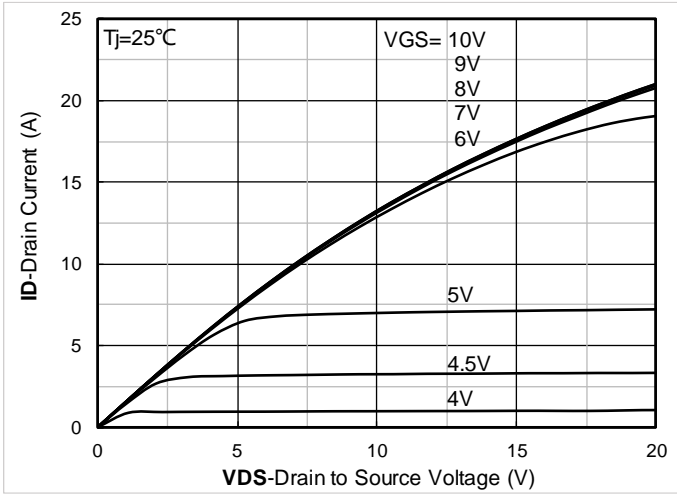


Figure 1. Output Characteristics

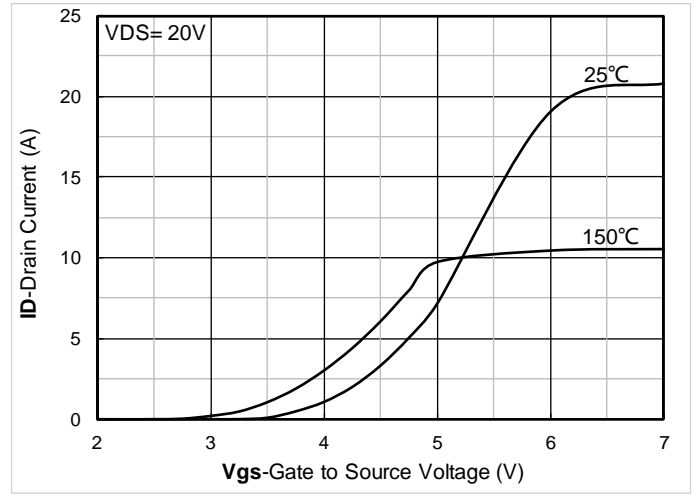


Figure 2. Transfer Characteristics

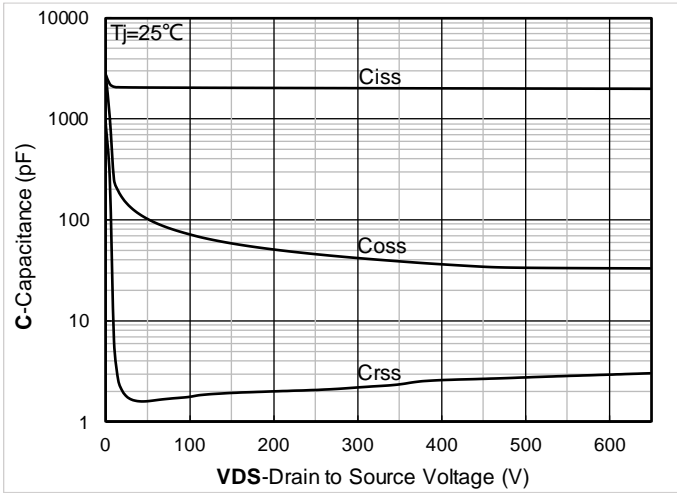


Figure 3. Capacitance Characteristics

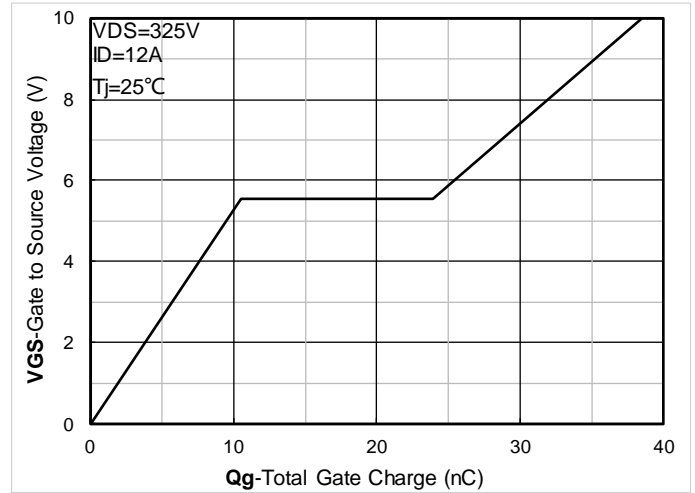


Figure 4. Gate Charge

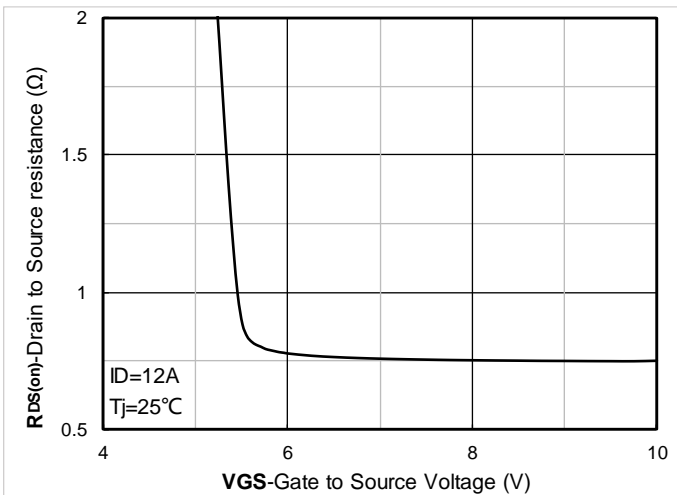


Figure 5. On-Resistance vs Gate to Source Voltage

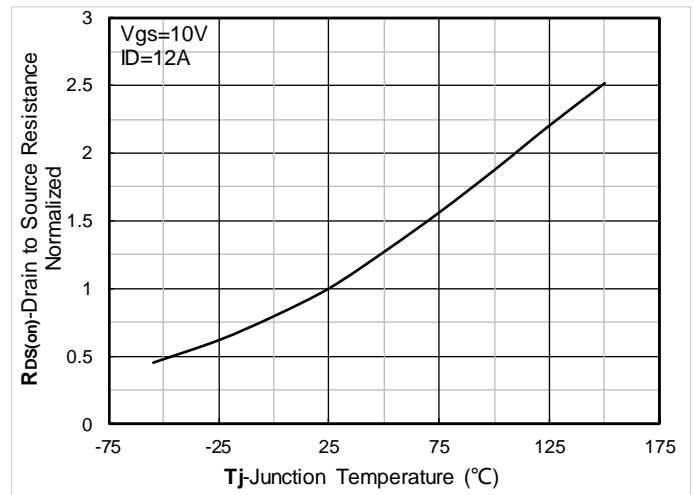


Figure 6. Normalized On-Resistance



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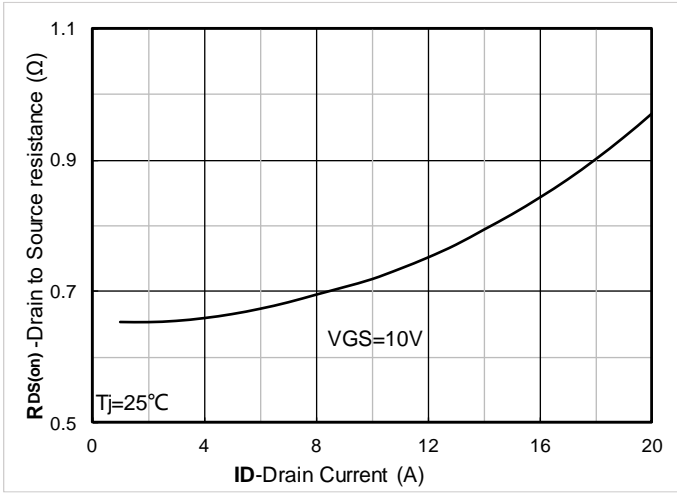


Figure 7. RDS(on) VS Drain Current

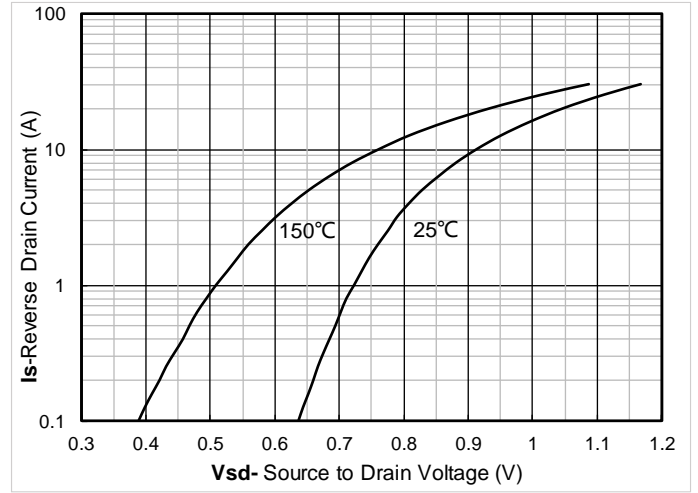


Figure 8. Forward characteristics of reverse diode

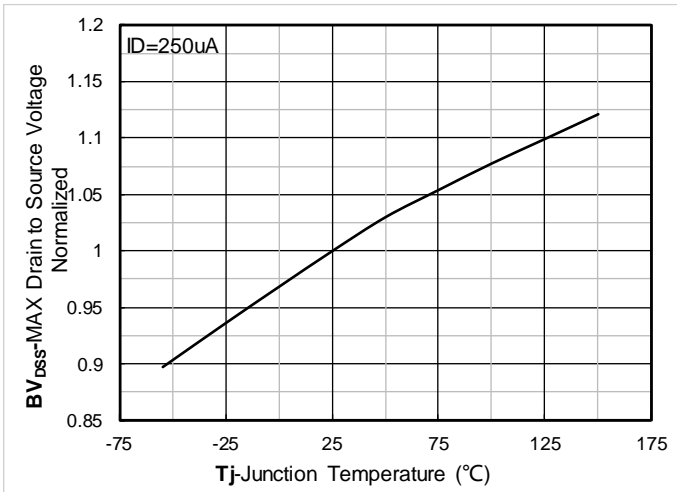


Figure 9. Normalized breakdown voltage

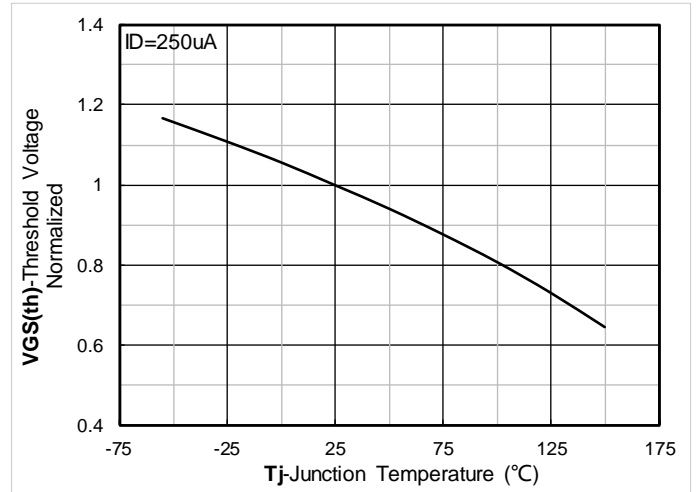


Figure 10. Normalized Threshold voltage

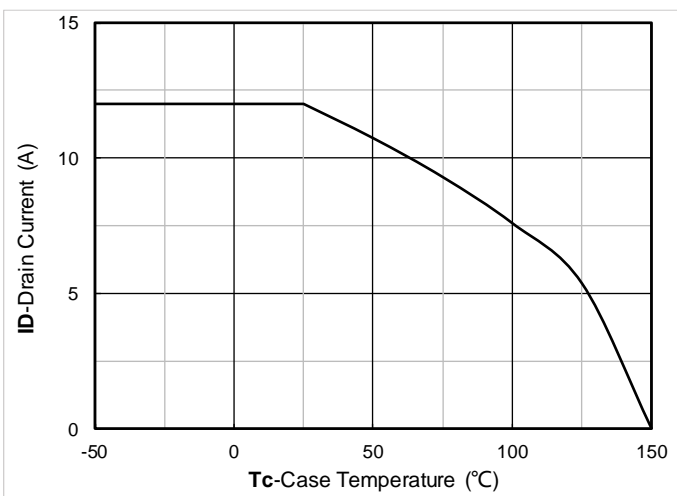


Figure 11. Current dissipation

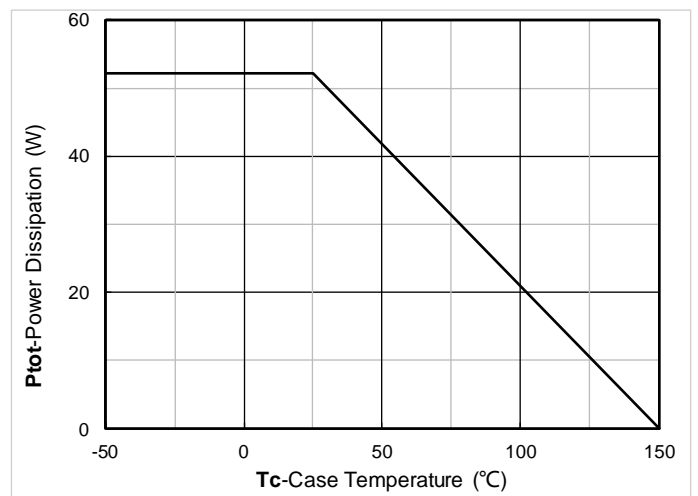


Figure 12. Power dissipation

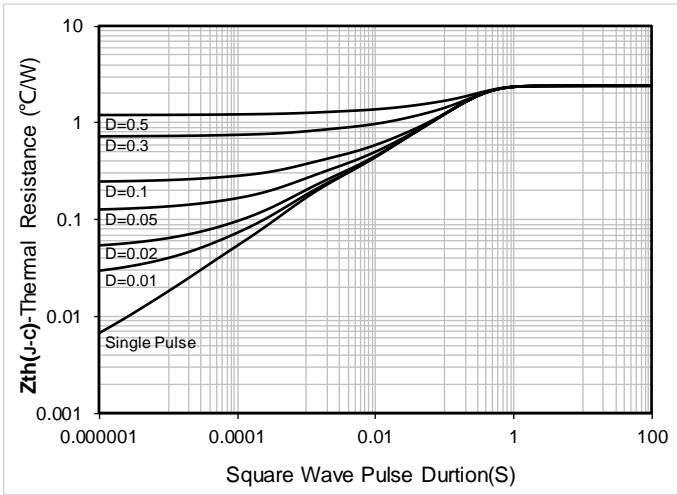


Figure 13. Maximum Transient Thermal Impedance

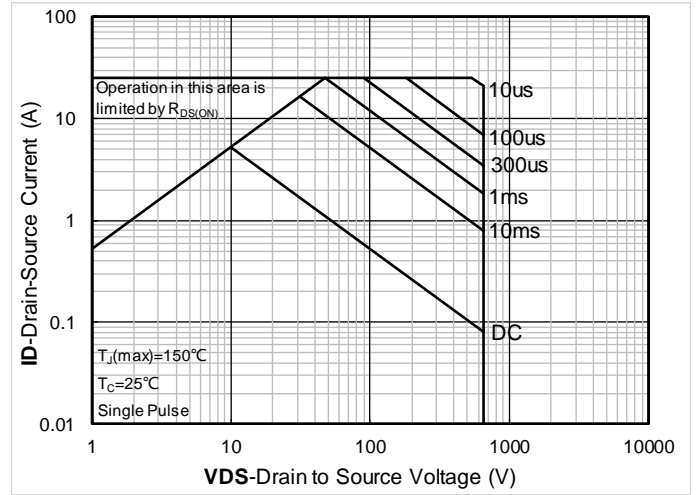


Figure 14. Safe Operation Area

## ■ Test Circuits & Waveforms

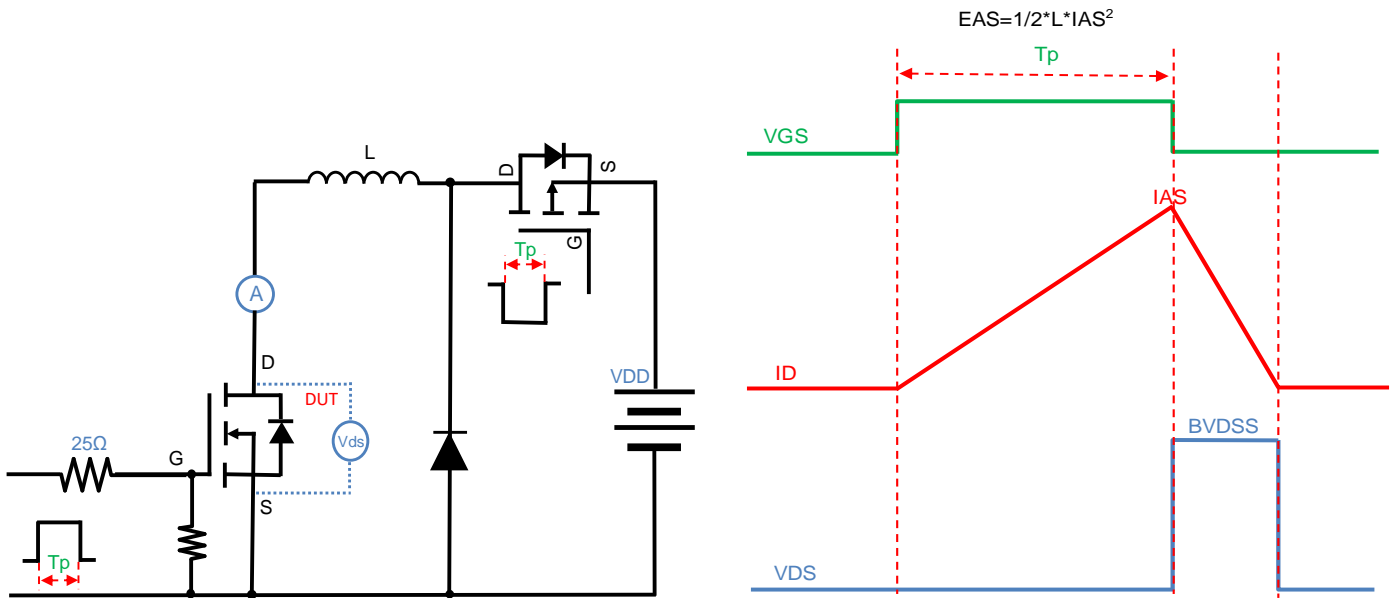


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

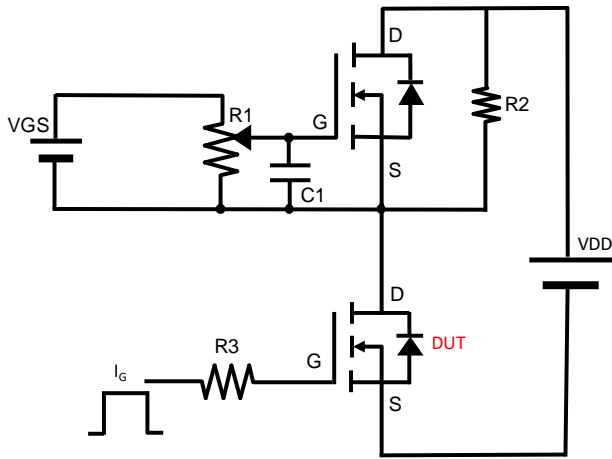


Figure B. Gate Charge Test Circuit & Waveform

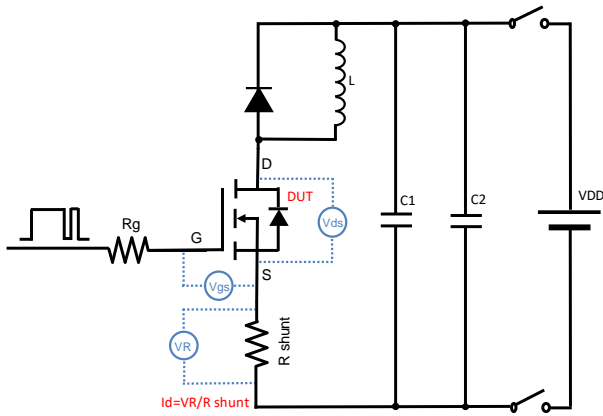


Figure C. Resistive Switching Test Circuit & Waveform

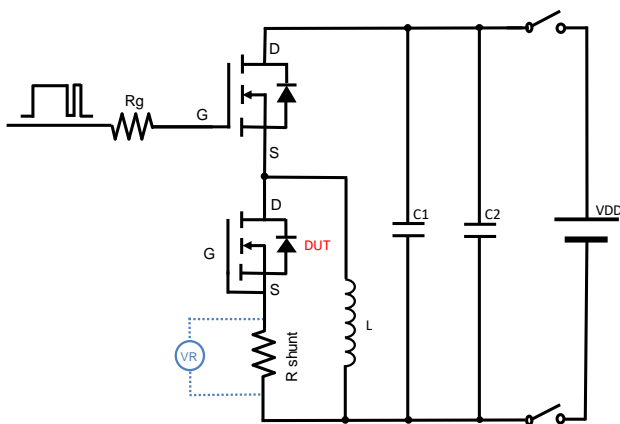
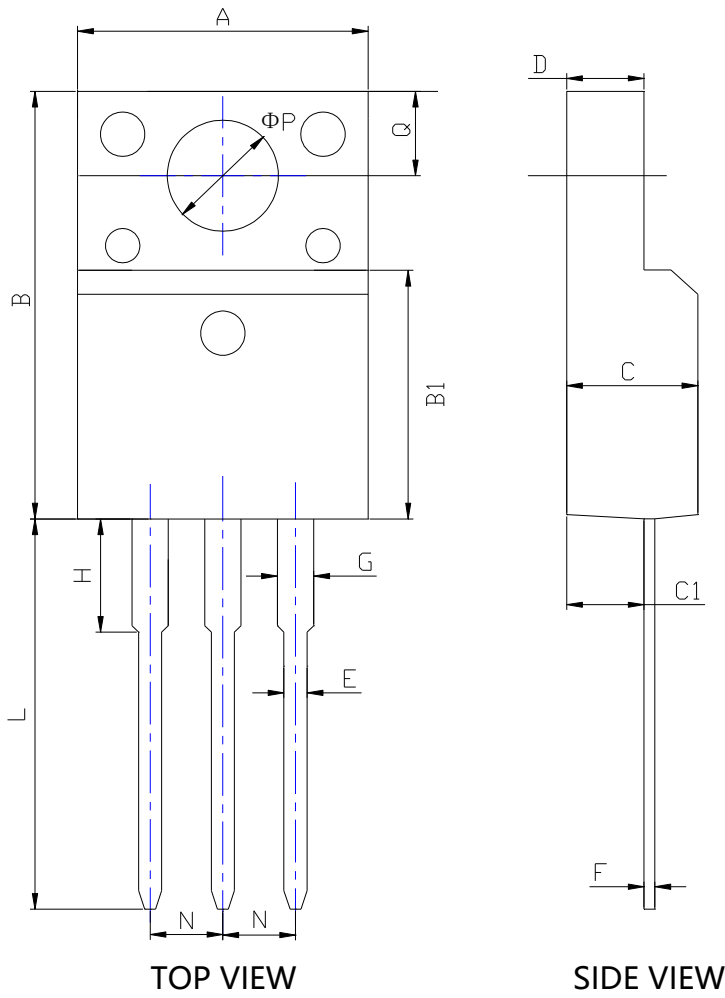


Figure D. Diode Recovery Test Circuit & Waveform



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## ■ ITO-220AB-C Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.382	0.406	9.700	10.300
B	0.610	0.634	15.500	16.100
B1	0.354	0.370	8.990	9.390
C	0.177	0.193	4.500	4.900
C1	0.102	0.116	2.600	2.950
D	0.092	0.108	2.340	2.740
E	0.028	0.035	0.700	0.900
F	0.016	0.024	0.400	0.600
G	0.044	0.056	1.120	1.420
H	0.106	0.126	2.700	3.200
L	0.496	0.535	12.600	13.600
N	0.092	0.108	2.340	2.740
Q	0.124	0.140	3.150	3.550
$\Phi P$	0.118	0.130	3.000	3.300

NOTE:  
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.



# YJF12N65HX

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