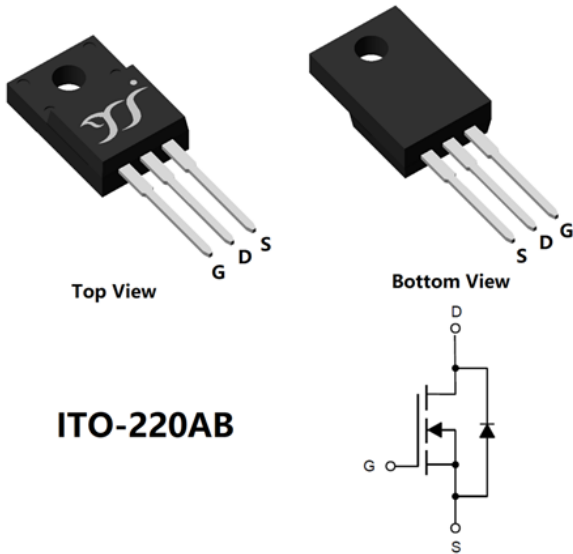


## N-Channel Enhancement Mode Field Effect Transistor



**ITO-220AB**

### Product Summary

- $V_{DS}$  650V
- $I_D$  7.5A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ ) <400m $\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Super Junction High Voltage MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- LED Lighting
- Adapter

### Limiting Values

Parameter	Conditions	Symbol	Min	Max	Unit	
Drain-source Voltage		$V_{DS}$	-	650	V	
Gate-source Voltage		$V_{GS}$	-30	30	V	
Continuous Drain Current (Note 1,2)	Steady-State	$I_D$	$T_A=25^\circ C, V_{GS}=10V$	-	1.4	A
			$T_A=100^\circ C, V_{GS}=10V$	-	0.9	
Continuous Drain Current (Note 1,3)	Steady-State	$I_D$	$T_C=25^\circ C, V_{GS}=10V, \text{Chip limitation}$	-	7.5	
			$T_C=100^\circ C, V_{GS}=10V$	-	4.7	
Pulsed Drain Current	$T_C=25^\circ C, t_p \leq 10\mu s$	$I_{DM}$	-	28		
Maximum Body-Diode Continuous Current	$T_C=25^\circ C$	$I_S$	-	7.5		
Maximum Body-Diode Pulsed Current	$T_C=25^\circ C, t_p \leq 10\mu s$	$I_{SM}$	-	28		
Avalanche Energy (non-repetitive)	$T_J=25^\circ C, V_G=10V, R_G=25\Omega, L=30mH, I_{AS}=3.9A$	EAS	-	228.15	mJ	
Total Power Dissipation (Note 1,2)	Steady-State	$P_D$	$T_A=25^\circ C$	-	2	W
			$T_A=100^\circ C$	-	0.8	
Total Power Dissipation (Note 1,3)	Steady-State	$P_D$	$T_C=25^\circ C$	-	56	
			$T_C=100^\circ C$	-	22	
MOSFET dv/dt Ruggedness	$V_{DS}=0 \dots 325V, R_G=0\Omega$	dv/dt	-	17.8	V/ns	
Reverse Diode dv/dt	$V_{DS}=0 \dots 325V, I_D \leq 4A, di/dt=200A/\mu s$	dv/dt	-	12.4	V/ns	
Maximum Diode Commutation Speed	$V_{DS}=0 \dots 325V, I_D \leq 4A, R_G=0\Omega$	dif/dt	-	2930	A/ $\mu s$	
Insulation withstand voltage	$V_{rms}, t=60s$	$V_{ISO}$	-	2	KV	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55	150	$^\circ C$	

### Thermal Resistance

Parameter	Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\theta JA}$	-	60	$^\circ C/W$
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	2.2	

### Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJF400C65BHJ	B1	YJF400C65BH	50	/	5000	Tube



# YJF400C65BHJ

## ■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A, T_J=25^\circ C$	650	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=650V, V_{GS}=0V, T_J=150^\circ C$	-	-	100	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V, T_J=25^\circ C$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A, T_J=25^\circ C$	3.2	4	4.8	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=5A, T_J=25^\circ C$	-	335	400	m $\Omega$
		$V_{GS}=10V, I_D=5A, T_J=150^\circ C$	-	836	998	
Diode Forward Voltage	$V_{SD}$	$I_S=7.5A, V_{GS}=0V, T_J=25^\circ C$	-	0.85	1.2	V
Gate Resistance	$R_G$	$f=1MHz, T_J=25^\circ C$	-	6	-	$\Omega$
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=325V, V_{GS}=0V, f=1MHz, T_J=25^\circ C$	-	800	-	pF
Output Capacitance	$C_{oss}$		-	20	-	
Reverse Transfer Capacitance	$C_{rss}$		-	1.2	-	
Effective Output capacitance, Energy Related	$C_{o(er)}$	$V_{DS}=0\dots 325V, V_{GS}=0V, f=1MHz, T_J=25^\circ C$	-	33.5	-	
Effective Output Capacitance, Time Related	$C_{o(tr)}$		-	166	-	
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=325V, I_D=5A, T_J=25^\circ C$	-	18.8	-	nC
Gate-Source Charge	$Q_{gs}$		-	4.7	-	
Gate-Drain Charge	$Q_{gd}$		-	8.3	-	
Reverse Recovery Charge	$Q_{rr}$	$I_F=5A, di/dt=100A/\mu s, V_{GS}=0V, V_R=325V, T_J=25^\circ C$	-	1933	-	nC
Reverse Recovery Time	$t_{rr}$		-	203	-	ns
Peak Reverse Recovery Current	$I_{rm}$		-	17.7	-	A
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=325V, I_D=5A, R_{GEN}=3\Omega, T_J=25^\circ C$	-	22	-	ns
Turn-on Rise Time	$t_r$		-	22	-	
Turn-off Delay Time	$t_{D(off)}$		-	25	-	
Turn-off Fall Time	$t_f$		-	29	-	

### Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of  $R_{\theta JA}$  is measured in the still air environment with  $T_A=25^\circ C$ . The maximum allowed junction temperature of  $150^\circ C$ .
- Thermal resistance from junction to soldering point (on the exposed drain pad).



# YJF400C65BHJ

## Typical Electrical and Thermal Characteristics Diagrams

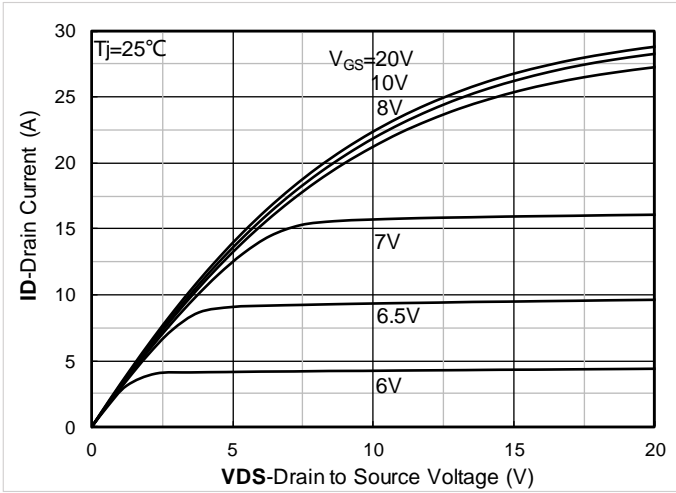


Figure 1. Output Characteristics; typical values

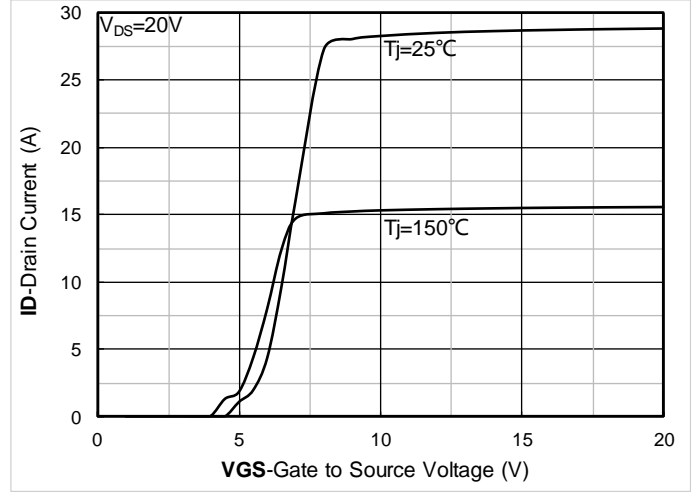


Figure 2. Transfer Characteristics; typical values

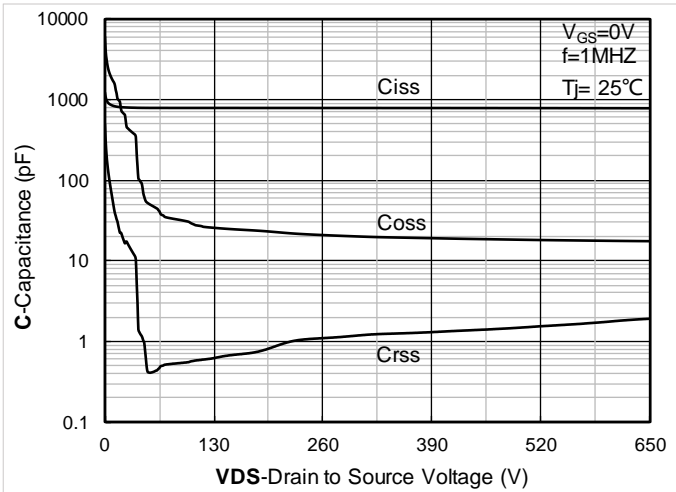


Figure 3. Capacitance Characteristics; typical values

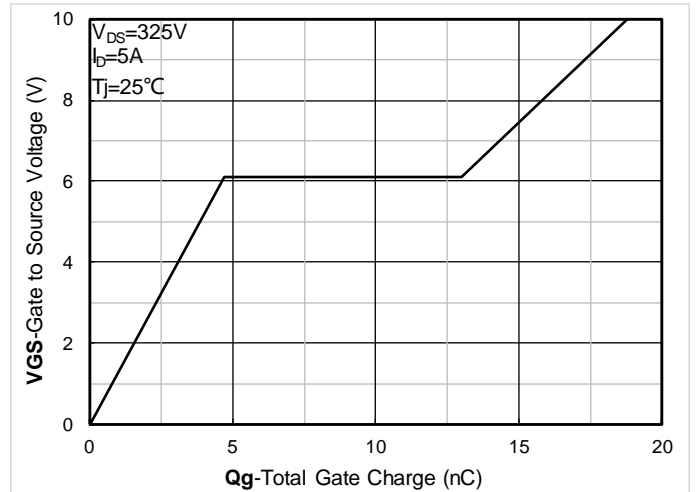


Figure 4. Gate Charge; typical values

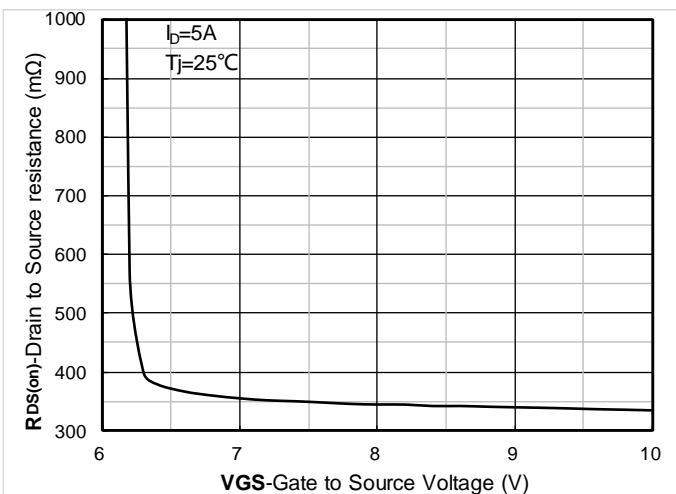


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

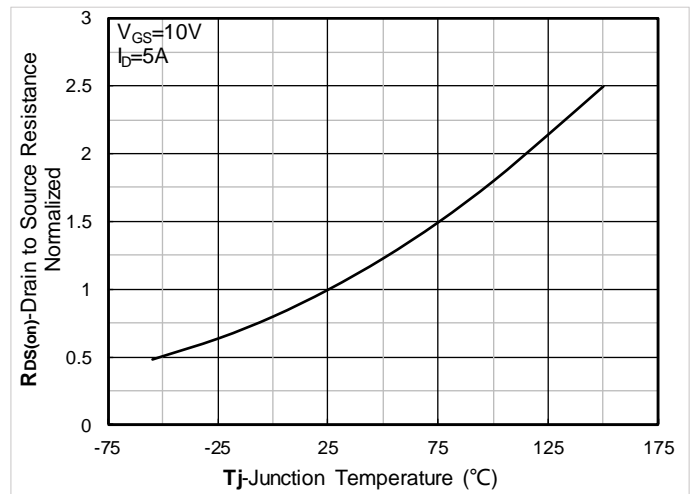


Figure 6. Normalized On-Resistance



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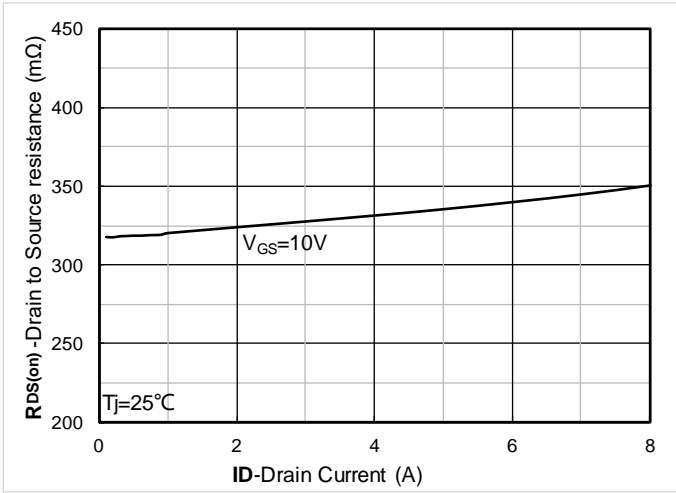


Figure 7. RDS(on) vs. Drain Current; typical values

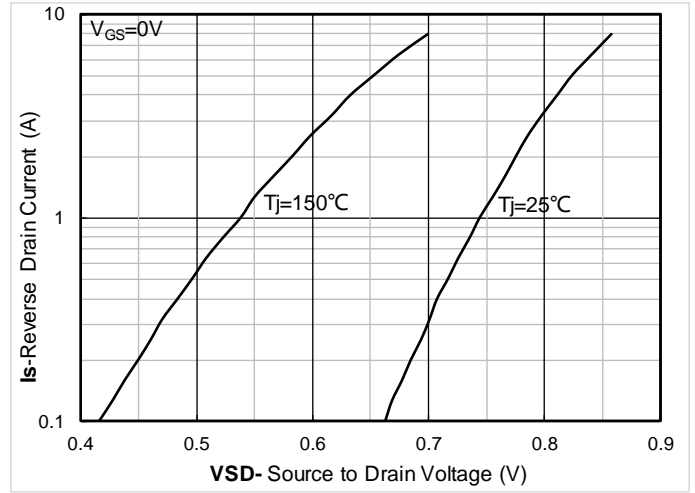


Figure 8. Forward characteristics of reverse diode; typical values

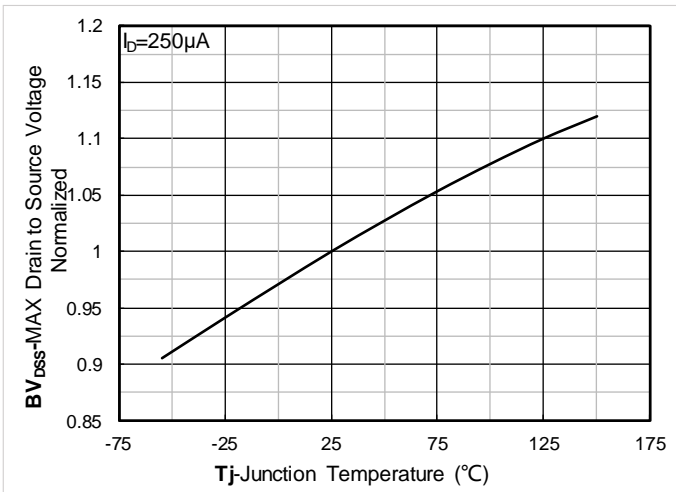


Figure 9. Normalized breakdown voltage

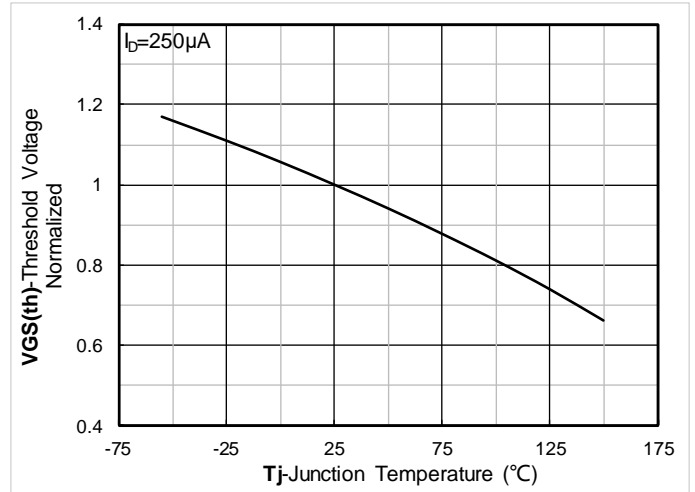


Figure 10. Normalized Threshold voltage

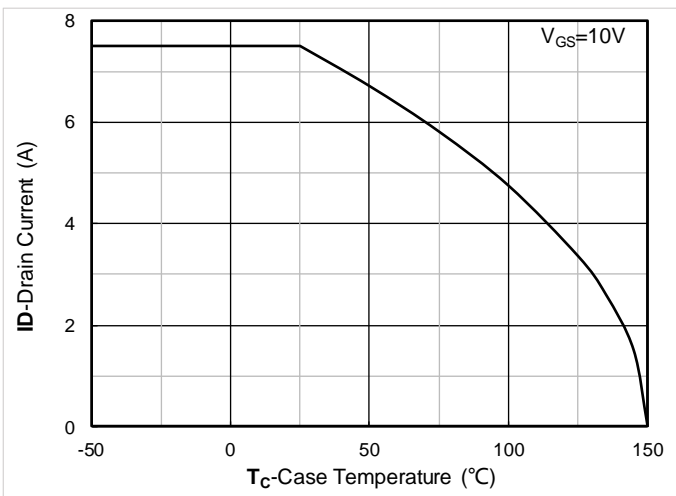


Figure 11. Current dissipation

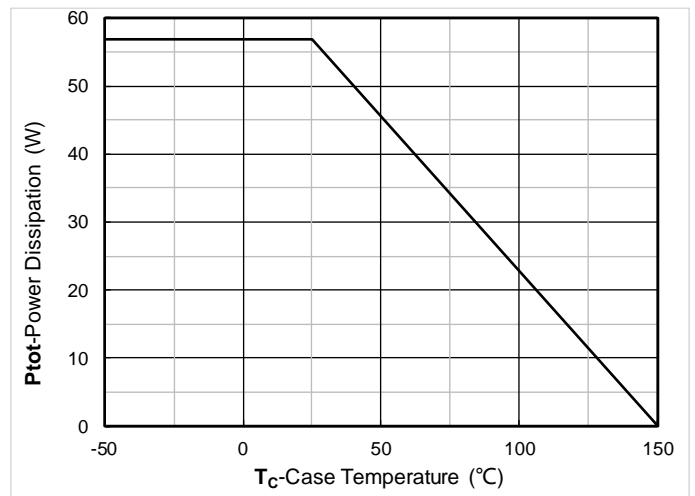


Figure 12. Power dissipation



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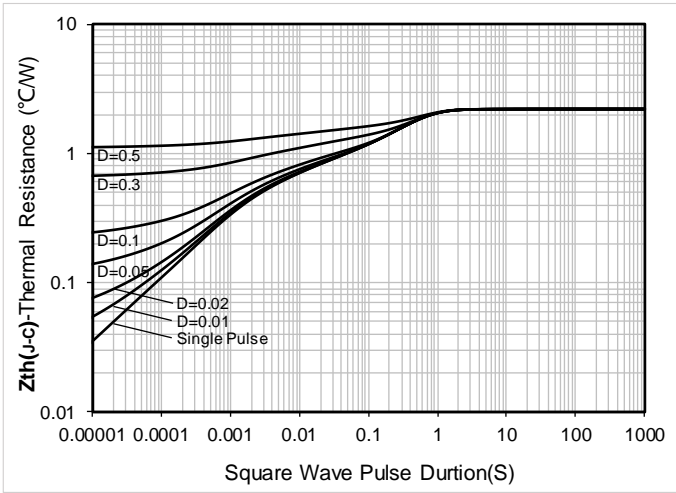


Figure 13. Maximum Transient Thermal Impedance

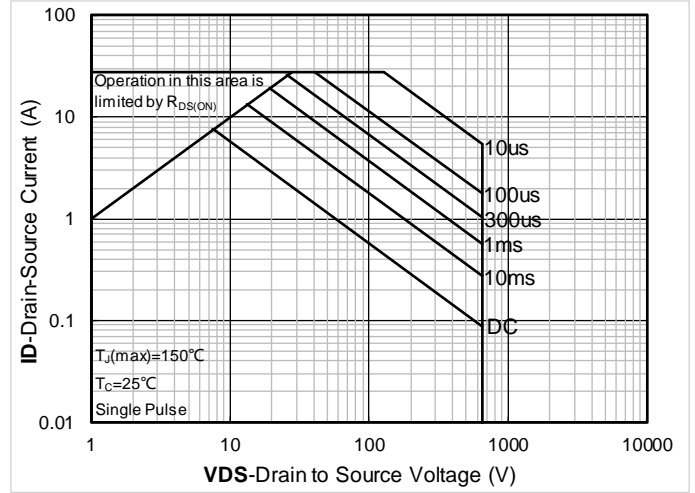


Figure 14. Safe Operation Area

## ■ Test Circuits & Waveforms

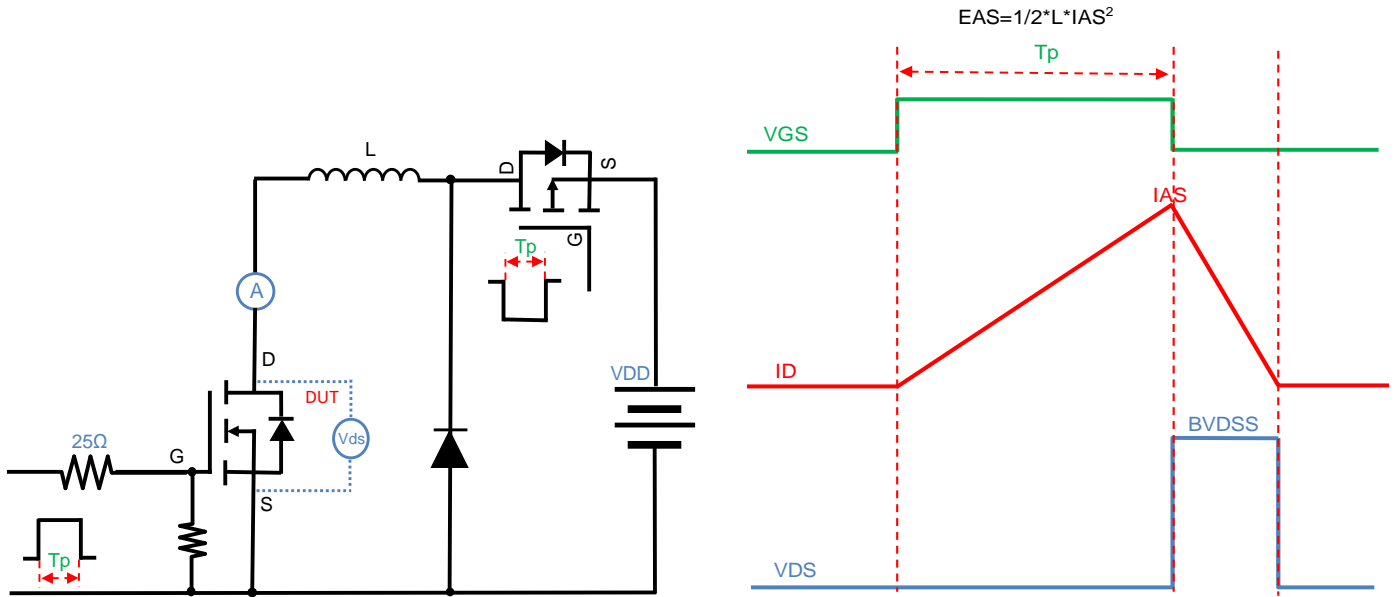


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

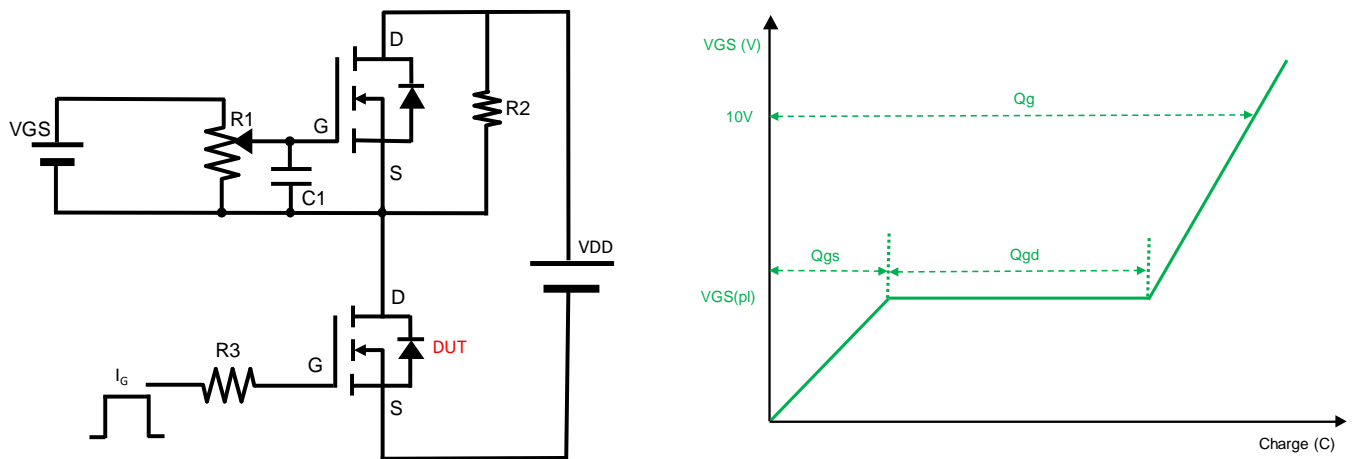


Figure B. Gate Charge Test Circuit & Waveform

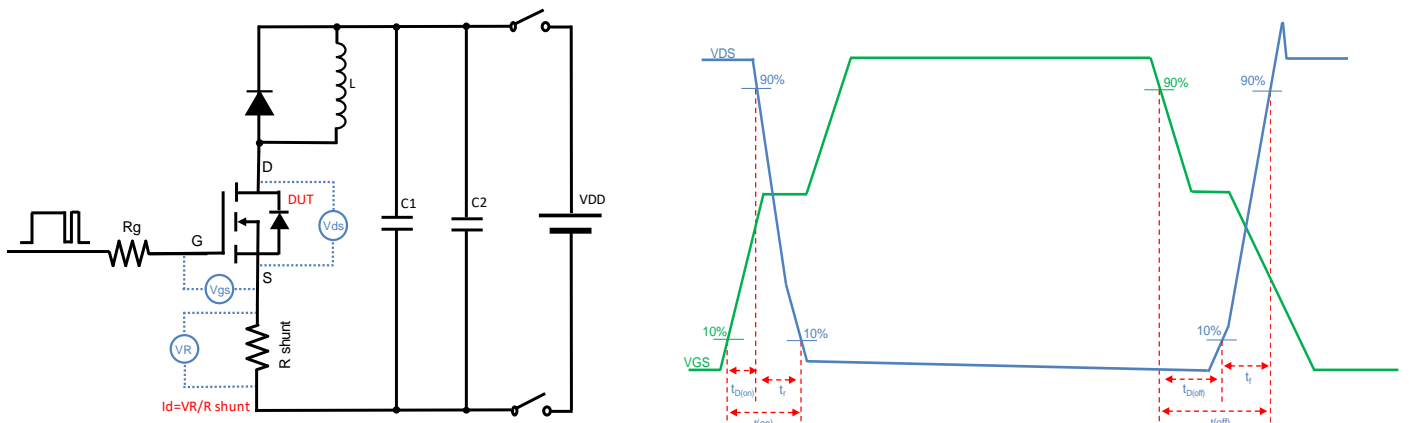


Figure C. Resistive Switching Test Circuit & Waveform

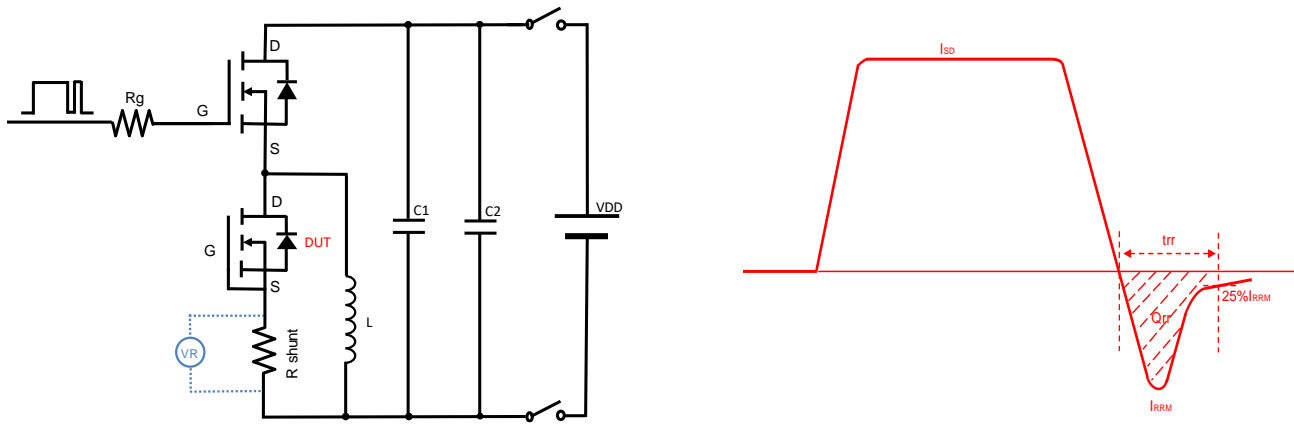
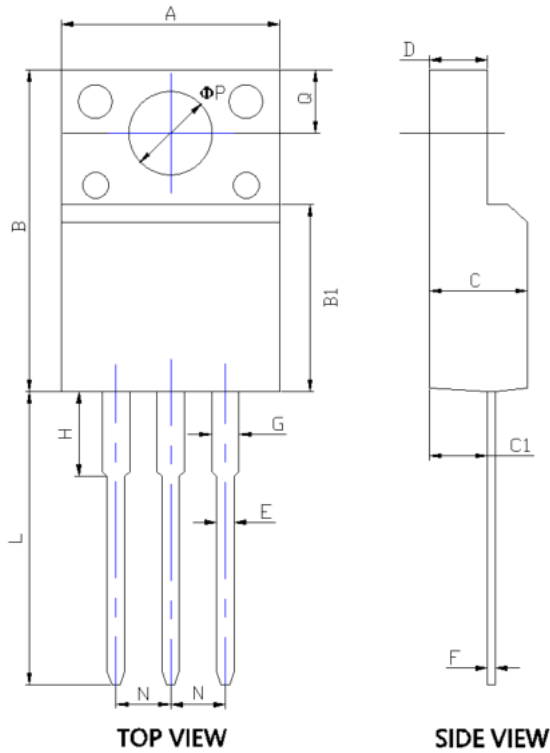


Figure D. Diode Recovery Test Circuit & Waveform



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## ■ ITO-220AB-E Package information



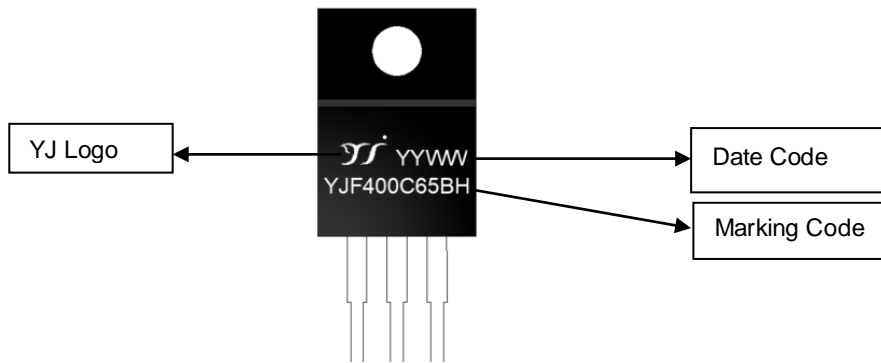
SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.390	0.406	9.900	10.300
B	0.610	0.633	15.500	16.100
B1	0.350	0.374	8.900	9.500
C	0.181	0.189	4.600	4.800
C1	0.087	0.110	2.200	2.800
D	0.096	0.104	2.450	2.650
E	0.028	0.035	0.700	0.900
F	0.016	0.024	0.400	0.600
G	0.044	0.056	1.120	1.420
H	0.134	0.150	3.400	3.800
L	0.496	0.512	12.600	13.000
N	0.100BSC.		2.540BSC.	
Q	0.126	0.142	3.200	3.600
ΦP	0.122	0.130	3.100	3.300

**NOTE:**

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



## ■ Marking Information



**Note:**

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJF400C65BH is marking code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



## YJF400C65BHJ

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