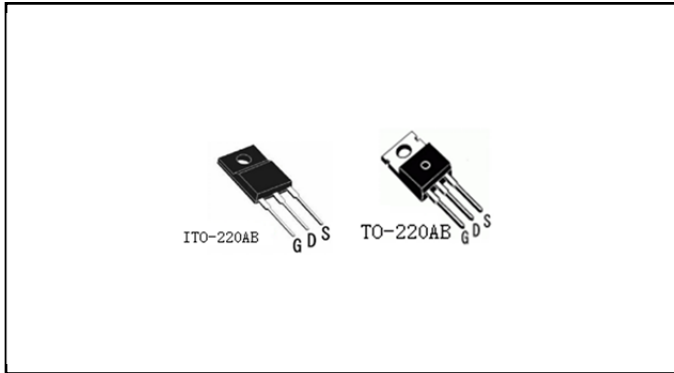
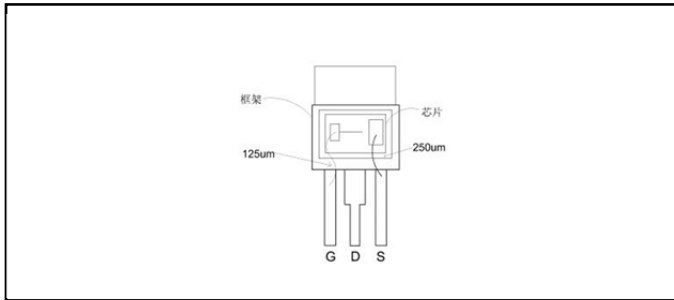


## N-Channel Enhancement Mode Mosfet



### Feature:

- Low Crss
- Low Gate Charge
- Fast Switching
- Improved ESD Capability
- Improved dv/dt Capability
- 100% Avalanche Energy Test



### Mechanical Data:

- **Package: MOS**  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant
- **Terminal: Tin plated leads.**  
Solderable per J-STD-002 and JESD22-B102
- **Polarity:** As marked on body

### ■ Ordering Information

P/N	PACKAGE	PACKING CODE	UNIT WEIGHT(g)	MINIIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJ10N65CI	ITO-220AB	B1	Approximate 1.7	50	1000	5000	TUBE
YJ10N65CZ	TO-220AB	B1	Approximate 1.6	50	1000	5000	TUBE
YJ10N65CM	TO-263	B1	Approximate 2.0	50	1000	5000	TUBE


**■ Maximum Ratings** ( $T_a=25^\circ\text{C}$  Unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	650	V
Continues Drain Current	$I_D$	$T_c=25^\circ\text{C}$	10*
		$T_c=100^\circ\text{C}$	6*
Plused Drain Current (note 1)	$I_{DM}$	40	A
Gate-to-Source Voltage	$V_{GS}$	$\pm 30$	V
Single Pulsed Avalanche Energy (note 2)	$E_{AS}$	500	mJ
Avalanche Current (note 1)	$I_{AR}$	10	A
Repetitive Avalanche Energy (note 1)	$E_{AR}$	17	mJ
Peak Diode Recovery (note 3)	dv/dt	4.5	V/ns
Power Dissipation	$P_D$ $T_c=25^\circ\text{C}$	TO-220AB	178
		ITO-220AB	50
Power Dissipation Derating Factor	$P_{D(DF)}$ Above $25^\circ\text{C}$	TO-220AB	1.43
		ITO-220AB	0.4
Operating and Storage Temperature Range	$T_J, T_{STG}$	150, $-55 \sim +150$	$^\circ\text{C}$
Maximum Temperature for Soldering	$T_L$	300	$^\circ\text{C}$

**■ Electrical Characteristics** ( $T_a=25^\circ\text{C}$  Unless otherwise specified)

Off-Characteristics						
Parameter	Symbol	Tests Conditions	Min	Type	Max	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$ , referenced to $25^\circ\text{C}$	-	0.7	-	$\text{V}/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_c=25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=520\text{V}, T_c=125^\circ\text{C}$	-	-	10	
Gate-body leakage current, forward	$I_{GSSF}$	$V_{DS}=0\text{V}, V_{GS}=30\text{V}$	-	-	100	nA
Gate-body leakage current, reverse	$I_{GSSR}$	$V_{DS}=0\text{V}, V_{GS}=-30\text{V}$	-	-	-100	nA



On-Characteristics						
Parameter	Symbol	Tests Conditions	Min	Type	Max	Unit
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$	-	0.75	0.85	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D = 5.0A$ (note4)	-	8.0	-	S

Dynamic Characteristics						
Parameter	Symbol	Tests Conditions	Min	Type	Max	Unit
Input capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	1370	2100	pF
Output capacitance	$C_{oss}$		-	145	170	pF
Reverse transfer capacitance	$C_{rss}$		-	15	23	pF

Switching Characteristics						
Parameter	Symbol	Tests Conditions	Min	Type	Max	Unit
Turn-On delay time	$t_d(on)$	$V_{DD} = 325V, I_D = 10A, R_G = 25\Omega$ (note 4, 5)	-	40	82	ns
Turn-On rise time	$t_r$		-	90	182	ns
Turn-Off delay time	$t_d(off)$		-	148	296	ns
Turn-Off Fall time	$t_f$		-	96	195	ns
Total Gate Charge	$Q_g$	$V_{DS} = 520V, I_D = 10A, V_{GS} = 10V$ (note 4, 5)	-	50	65	nC
Gate-Source charge	$Q_{gs}$		-	8	-	nC
Gate-Drain charge	$Q_{gd}$		-	15	-	nC

Drain-Source Diode Characteristics and Maximum Ratings						
Parameter	Symbol	Tests Conditions	Min	Type	Max	Unit
Maximum Continuous Drain-Source Diode Forward Current		$I_S$	-	-	10	A
Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	-	-	40	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 10A$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$V_{GS} = 0V, I_S = 10A$ $di_F/dt = 100A/\mu s$ (note 4)	-	418	-	ns
Reverse recovery charge	$Q_{rr}$		-	3.4	-	$\mu C$

## ■ Thermal Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

Parameter	Symbol		Max	Unit
Thermal Resistance, Junction to Case	Rth(j-c)	TO-220AB	0.7	°C/W
		ITO-220AB	2.5	
Thermal Resistance, Junction to Ambient	Rth(j-A)	TO-220AB	62.5	°C/W
		ITO-220AB	62.5	

\* Drain current limited by maximum junction temperature

Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: L=11.5mH, I<sub>AS</sub>=10A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C
- 3: I<sub>SD</sub> ≤ 10A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub>=25°C
- 4: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
- 5: Essentially independent of operating temperature

## ■ Characteristics (Typical)

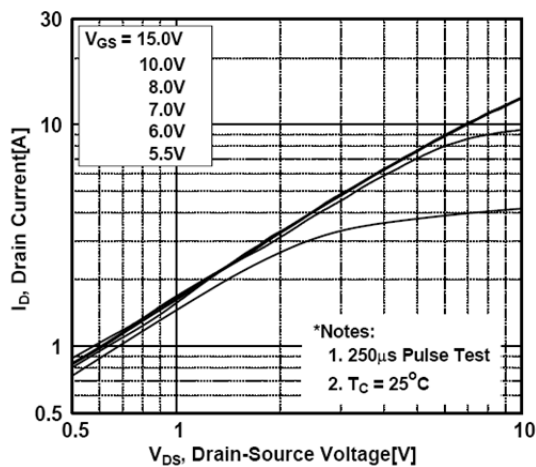


Fig. 1 On-State Characteristics

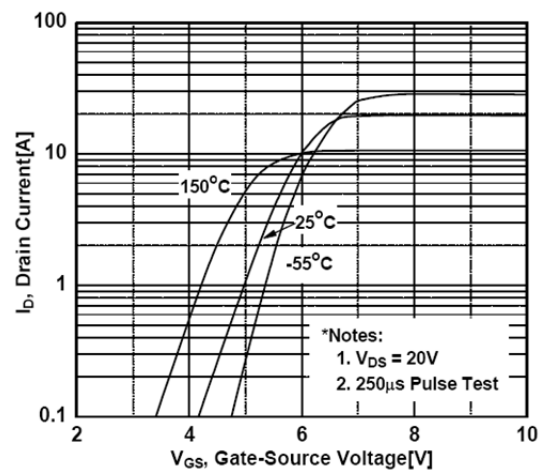


Fig. 2 Transfer Characteristics

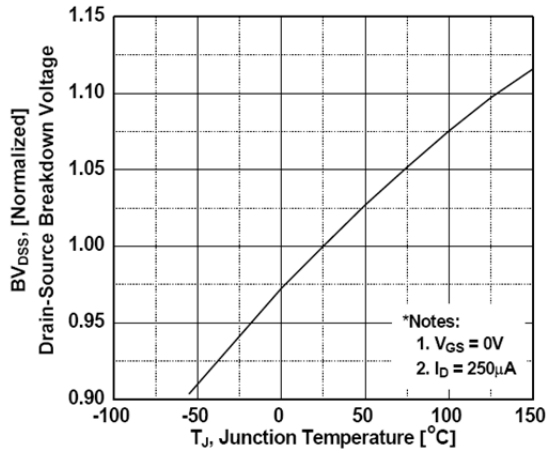


Fig. 3 Breakdown Voltage Variation vs Temperature

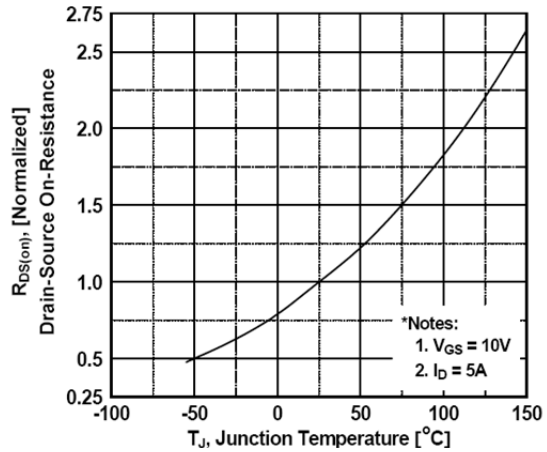


Fig. 4 On-Resistance Variation vs Temperature

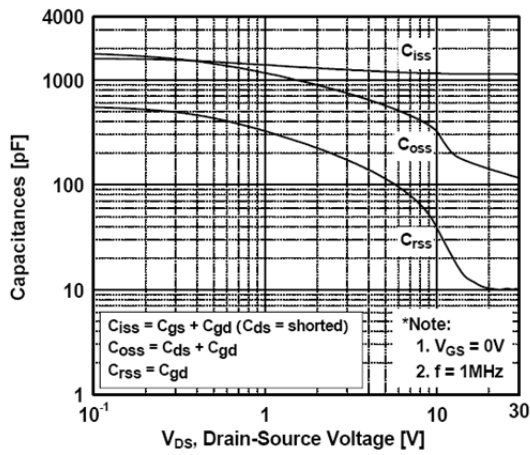


Fig. 5 Capacitance Characteristics

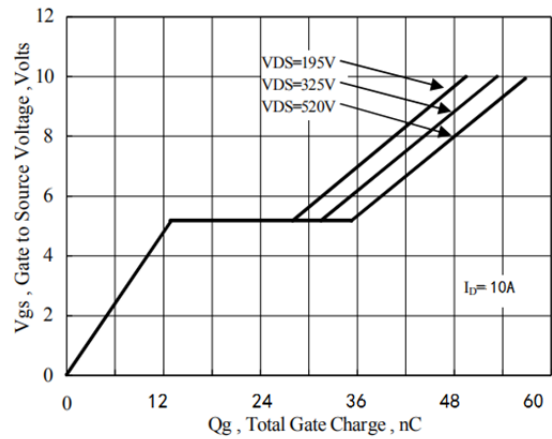


Fig. 6 Gate Charge Characteristics

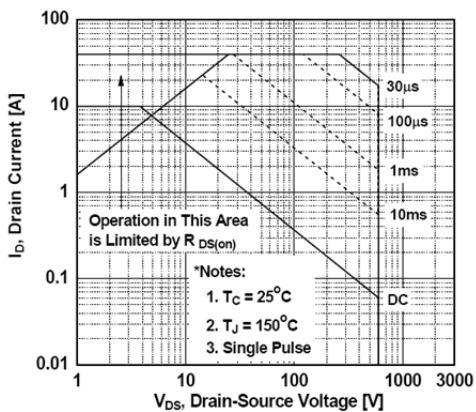


Fig. 7 Maximum Safe Operating Area

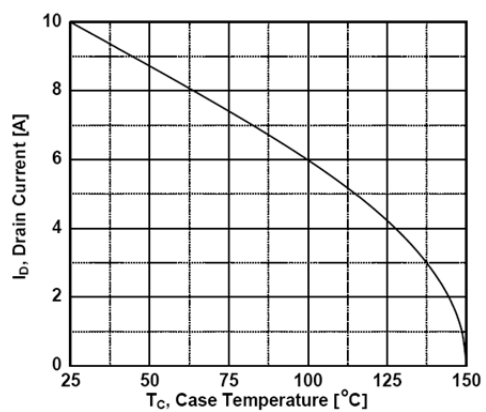


Fig. 8 Maximum Drain Current vs Case Temperature

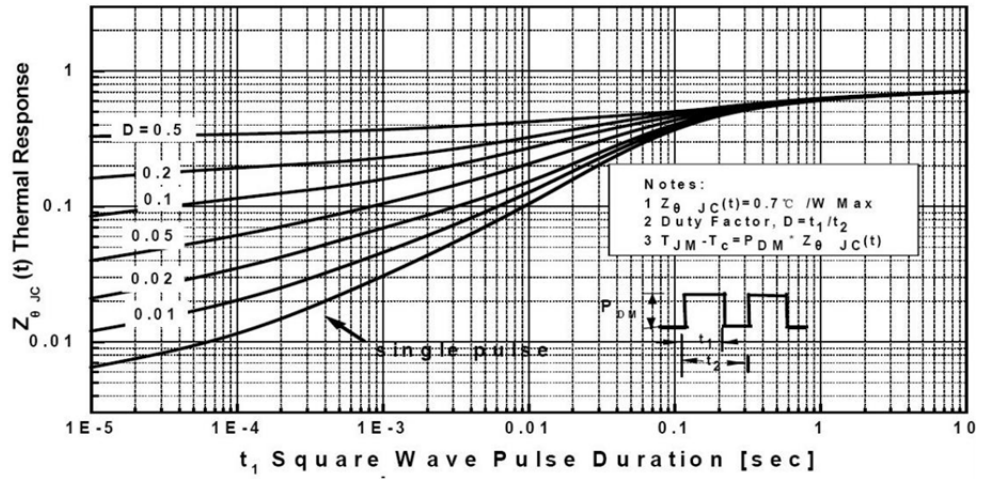


Fig. 9 Transient Thermal Response Curve(TO-220AB)

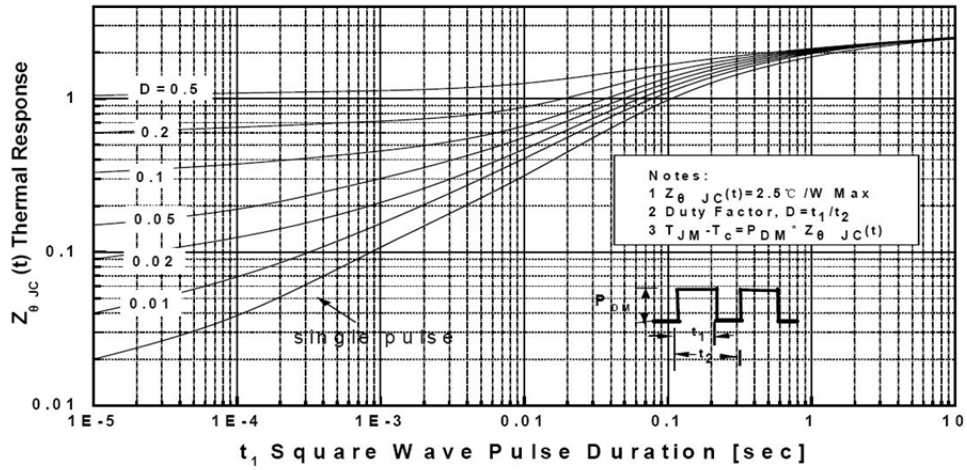
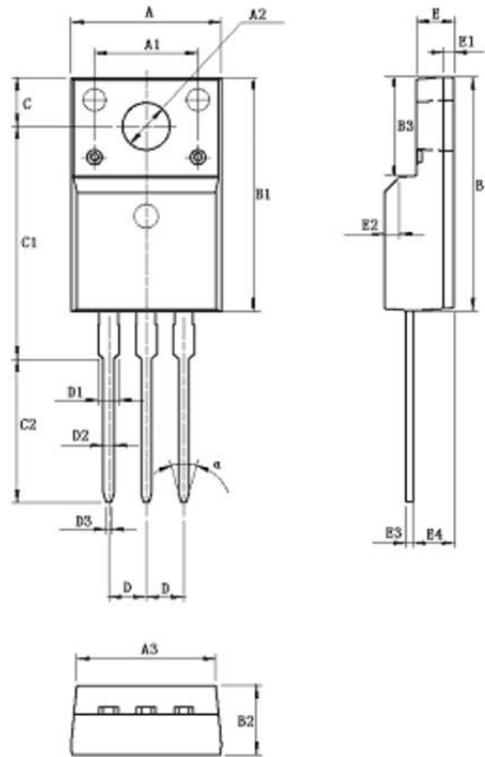


Fig. 10 Transient Thermal Response Curve(ITO-220AB)

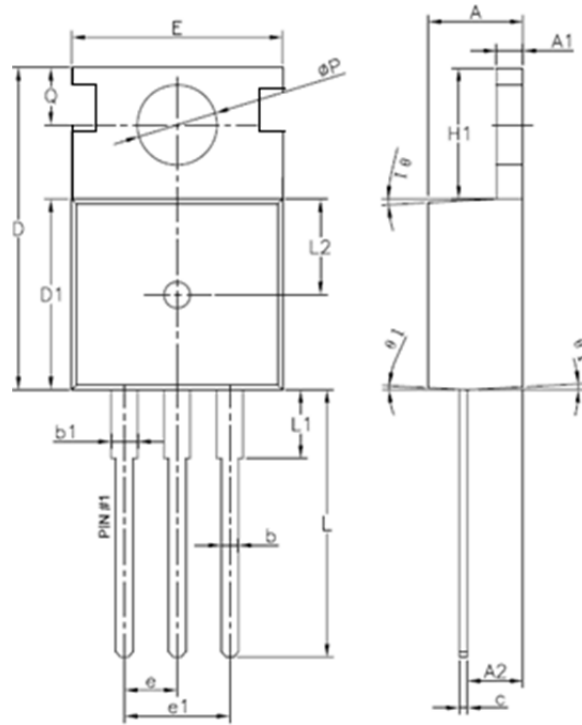
## ■ Outline Dimensions

### ITO-220AB



Symbol	Min	Max	Symbol	Min	Max
A	9.96	10.36	D	2.54	
A1	7.00		D1	1.15	1.35
A2	3.08	3.28	D2	0.70	0.90
A3	9.25	9.65	D3	0.28	0.48
B1	15.70	16.10	E	2.34	2.74
B2	4.50	4.90	E1	0.70	
B3	6.20	6.80	E2	1.0×45°	
C	3.20	3.40	E3	0.36	0.65
C1	15.20	16.00	E4	2.55	2.95
C2	9.75	10.15	a(度)	30°	

## TO-220AB



Symbol	Min	Normal	Max	Symbol	Min	Normal	Max
<b>A</b>	4.4	4.5	4.6	<b>e</b>		2.54	
<b>A1</b>	1.27	1.3	1.33	<b>e1</b>		5.08	
<b>A2</b>	2.3	2.4	2.5	<b>H1</b>	6.3	6.5	6.7
<b>b</b>	0.7	/	0.9	<b>L</b>	13.0	13.38	13.5
<b>b1</b>	1.25		1.42	<b>L1</b>	/	/	3.5
<b>c</b>	0.45	0.5	0.6	<b>L2</b>		4.6	
<b>D</b>	15.3	15.7	16.1	<b><math>\Phi P</math></b>	3.55	3.6	3.65
<b>D1</b>	9.1	9.2	9.3	<b>Q</b>	2.73	/	2.87
<b>E</b>	9.7	9.9	10.2	<b><math>\theta_1</math> (<math>^\circ</math>)</b>	1	3	5





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