

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
650V	99mΩ@10V	36A

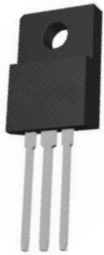
### Feature

- New technology for high voltage device
- Ultra low on-resistance and ultra low conduction losses
- Ultra Low Gate Charge cause lower driving requirements
- Diode reverse recovery speed is super fast
- High reliability

### Application

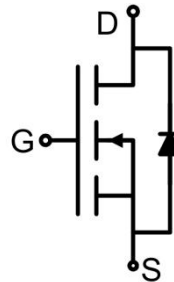
- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible Power Supply (UPS)
- On-board charger (OBC)

### Package

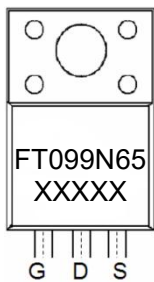


ITO-220AB

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current (T <sub>C</sub> =25°C)	I <sub>D</sub>	36	A
Continuous Drain Current (T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	25.2	A
Pulsed Drain Current <sup>1)</sup>	I <sub>DM</sub>	108	A
Power Dissipation (T <sub>C</sub> =25°C)	P <sub>D</sub>	35	W
Derate above 25°C	-	0.23	W/°C
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	4.29	°C/W
Single pulse avalanche energy <sup>2)</sup>	E <sub>AS</sub>	324	mJ
Avalanche current <sup>1)</sup>	I <sub>AS</sub>	9	A
Repetitive Avalanche energy, t <sub>AR</sub> limited by T <sub>Jmax</sub> <sup>1)</sup>	E <sub>AR</sub>	0.39	mJ
Junction Temperature	T <sub>J</sub>	175	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +175	°C

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

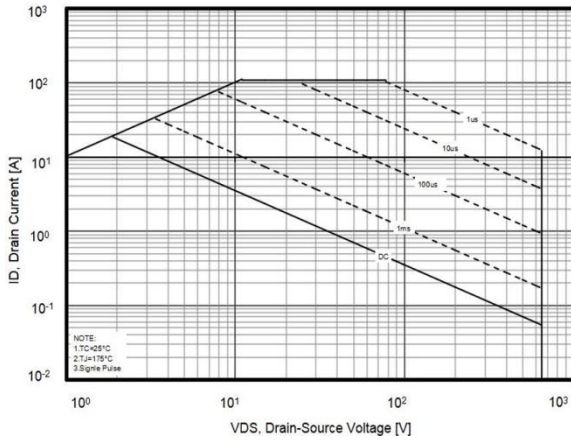
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA	650			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V, T <sub>C</sub> = 25°C			10	μA
		V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V, T <sub>C</sub> = 125°C			400	
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, 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> = 500μA	3.5	4.2	5.0	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 18A		85	99	mΩ
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1MHz		2800		pF
Output Capacitance	C <sub>oss</sub>			96		
Reverse Transfer Capacitance	C <sub>rss</sub>			6		
Gate Resistance	R <sub>g</sub>	f = 1MHz, open drain		1.5		Ω
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 480V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 18A		55		nC
Gate-Source Charge	Q <sub>gs</sub>			16.5		
Gate-Drain Charge	Q <sub>gd</sub>			25.5		
Gate Plateau Voltage	V <sub>gp</sub>			7.3		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 380V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 18A, R <sub>G</sub> = 1.7Ω		15		nS
Turn-on rise time	t <sub>r</sub>			14		
Turn-off delay time	t <sub>d(off)</sub>			72		
Turn-off fall time	t <sub>f</sub>			14		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>SD</sub>	T <sub>C</sub> = 25°C			36	A
Diode Forward Pulse Current	I <sub>SDM</sub>				108	
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0V, I <sub>SD</sub> = 36A			1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 18A, di/dt = 100A/μs		160		nS
Reverse Recovery Charge	Q <sub>rr</sub>			0.96		μC
Peak Reverse Recovery Current	I <sub>rrm</sub>			12		A

Notes:

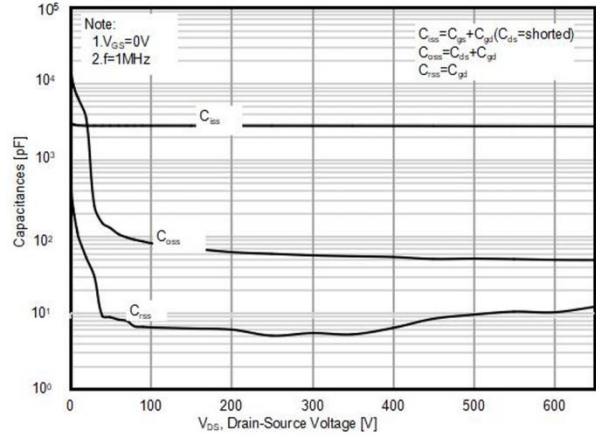
- 1) Repetitive Rating: Pulse width limited by maximum junction temperature
- 2) T<sub>J</sub> = 25°C, V<sub>DD</sub> = 50V, V<sub>G</sub> = 10V, R<sub>G</sub> = 25Ω.
- 3) Guaranteed by design, not subject to production testing.

## Typical Characteristics

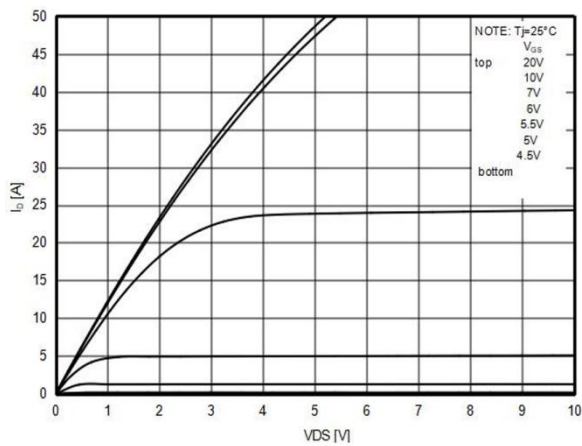
**Figure1. Safe operating area**



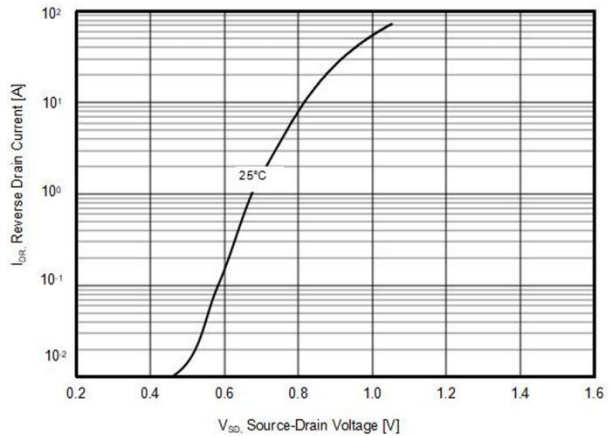
**Figure2. Capacitance**



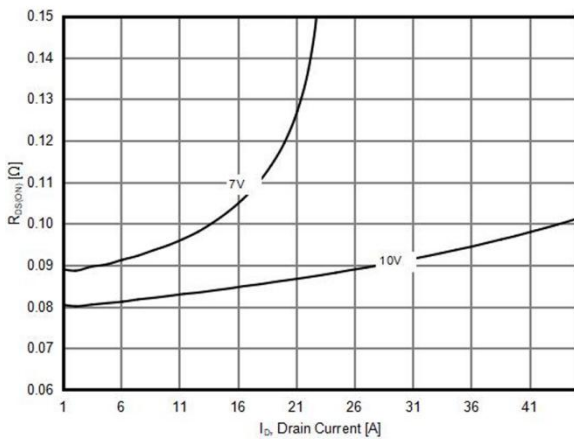
**Figure3. Output characteristics**



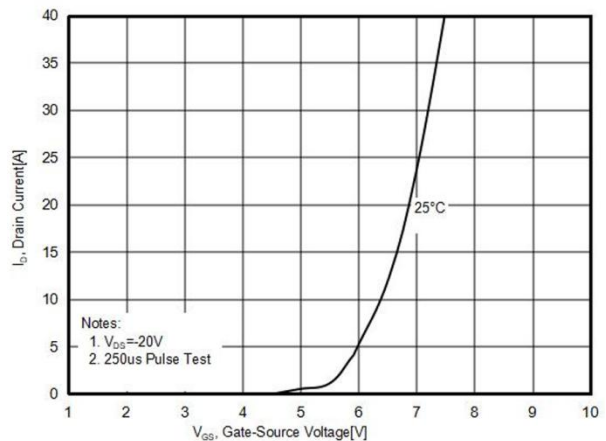
**Figure4. Source-Drain Diode Forward Voltage**



**Figure5. Static drain-source on resistance**

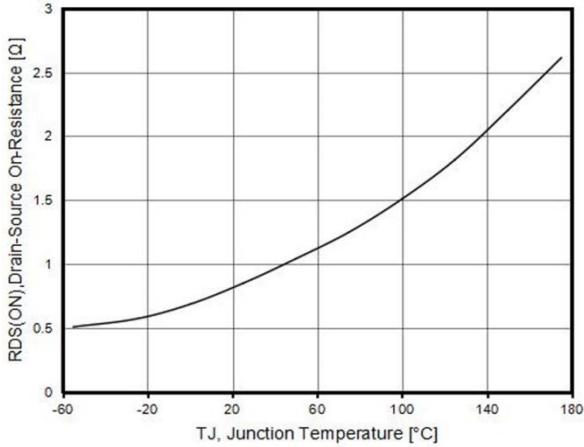


**Figure6. Transfer characteristics**

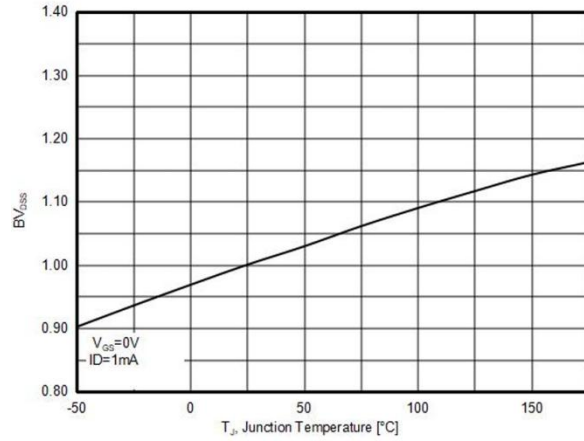


## Typical Characteristics

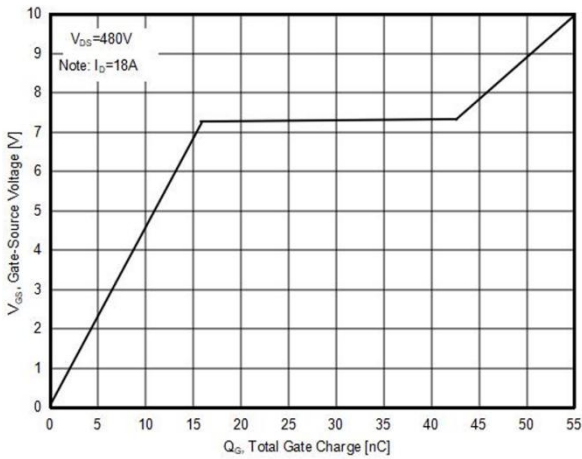
**Figure7.  $R_{DS(ON)}$  vs Junction Temperature**



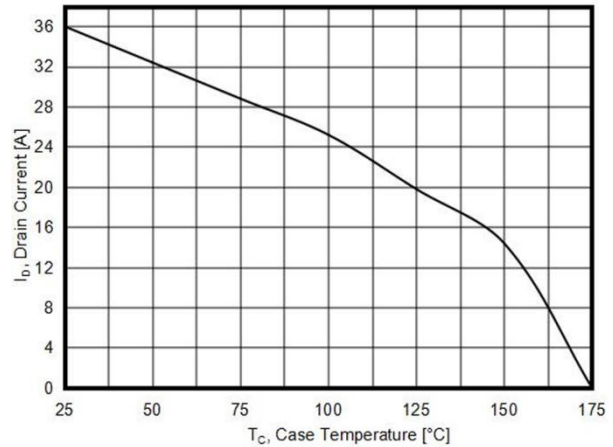
**Figure8.  $BV_{DSS}$  vs Junction Temperature**



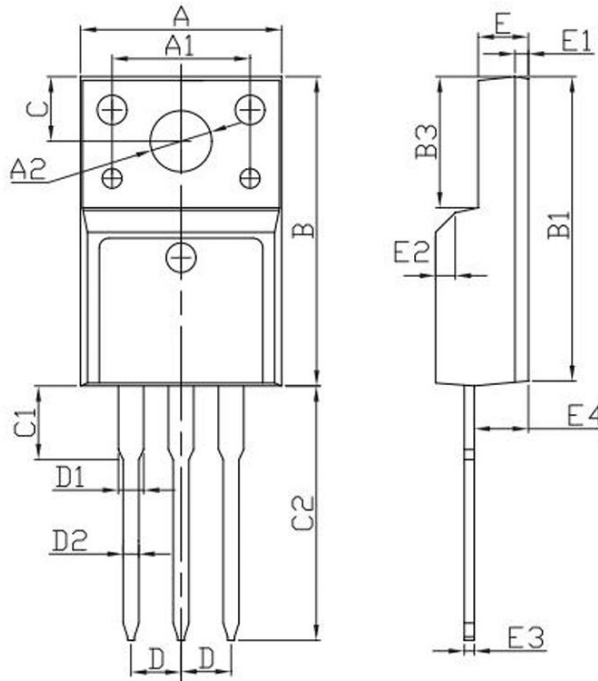
**Figure9. Gate charge waveforms**



**Figure10. Maximum  $I_D$  vs Junction Temperature**



### ITO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.860	10.460	0.388	0.412
A1	6.800	7.200	0.268	0.284
A2	2.920	3.320	0.115	0.131
B	15.400	16.400	0.607	0.646
B1	15.100	16.100	0.595	0.634
B3	6.400	7.000	0.252	0.276
C	3.050	3.550	0.120	0.140
C1	2.950	3.550	0.116	0.140
C2	28.200	29.200	1.111	1.150
D	2.54 BSC		0.100 BSC	
D1	-	1.470	-	0.058
D2	0.600	1.000	0.024	0.039
E	2.300	2.800	0.091	0.110
E1	0.450	0.950	0.018	0.037
E2	45°		45°	
E3	0.300	0.700	0.012	0.028
E4	2.450	3.050	0.097	0.120