

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
650V	190mΩ@10V	18A

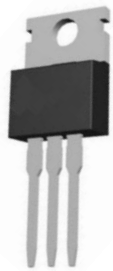
### Feature

- Optimized body diode reverse recovery performance
- Low on-resistance and low conduction losses
- Ultra Low Gate Charge cause lower driving requirements

### Application

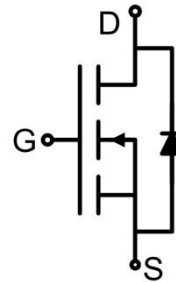
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)
- LLC Half-bridge

### Package

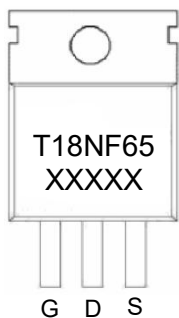


TO-220AB

### Circuit diagram



### Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage AC (f>1 Hz)	V <sub>GS</sub>	±30	V
Gate-Source Voltage DC	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	18	A
Continuous Drain Current (T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	12.6	A
Pulsed Drain Current <sup>1)</sup>	I <sub>DM</sub>	54	A
Power Dissipation	P <sub>D</sub>	194	W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.77	°C/W
Single pulse avalanche current <sup>2)</sup>	I <sub>AS</sub>	4	A
Junction Temperature	T <sub>J</sub>	175	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +175	°C

### Electrical characteristics (T<sub>A</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> = 250μA	650			V
Zero gate voltage drain current(T <sub>C</sub> =25°C)	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V			10	μA
Zero gate voltage drain current(T <sub>C</sub> =125°C)	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V			300	μA
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> = 250μA	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> = 9A		165	190	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 = 1.0MHz		1550		pF
Output Capacitance	C <sub>oss</sub>			60		
Reverse Transfer	C <sub>rss</sub>			5		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 480V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 9A		30		nC
Gate-Source Charge	Q <sub>gs</sub>			12.5		
Gate-Drain Charge	Q <sub>gd</sub>			11		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 380V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 9A, R <sub>G</sub> = 1.7Ω		43		nS
Turn-on rise time	t <sub>r</sub>			17		
Turn-off delay time	t <sub>d(off)</sub>			94		
Turn-off fall time	t <sub>f</sub>			26		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>	T <sub>C</sub> = 25°C			18	A
Diode Forward voltage	V <sub>SD</sub>	T <sub>J</sub> = 25°C, V <sub>GS</sub> = 0V, I <sub>S</sub> = 18A			1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 9A di/dt = 100A/μs		125		nS
Reverse Recovery Charge	Q <sub>rr</sub>			0.51		uC
Peak Reverse Recovery Current	I <sub>rrm</sub>			8.2		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

### Typical Characteristics

Figure1. Safe operating area

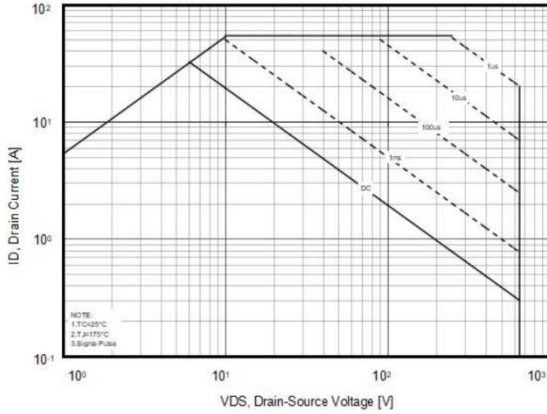


Figure2. Capacitance

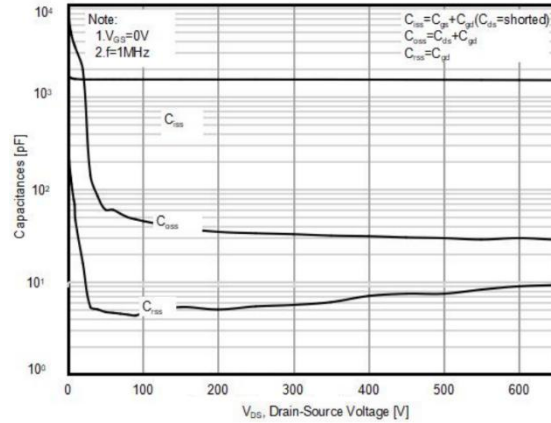


Figure3. Transfer characteristics

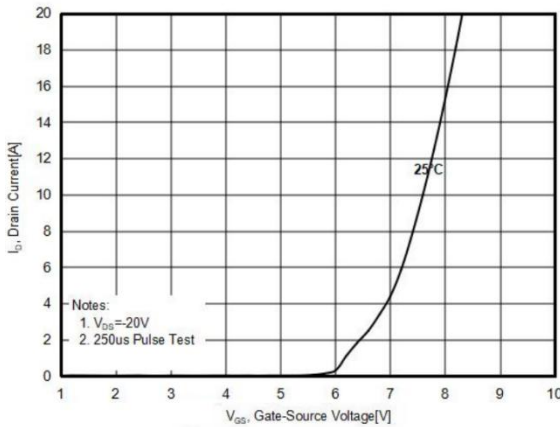


Figure4. Output characteristics

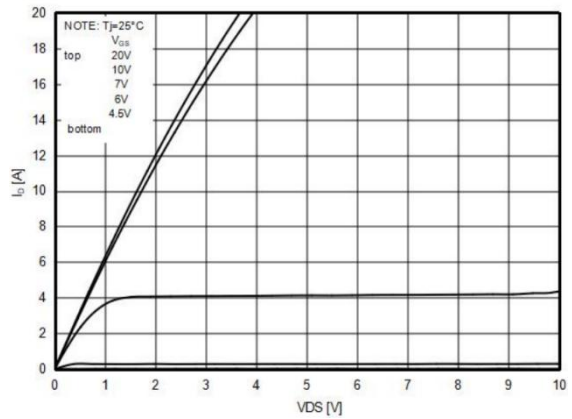


Figure5. R<sub>DS(ON)</sub> vs Junction Temperature

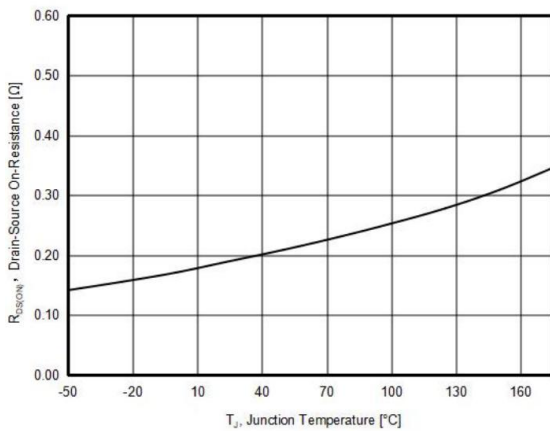
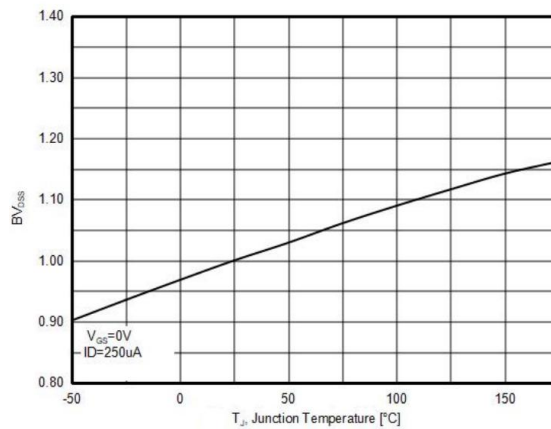


Figure6. BV<sub>DSS</sub> vs Junction Temperature



## Typical Characteristics

Figure7. Maximum  $I_D$  vs Junction Temperature

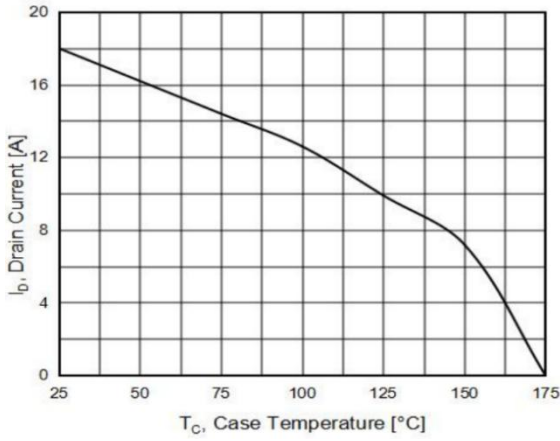


Figure8. Gate charge waveforms

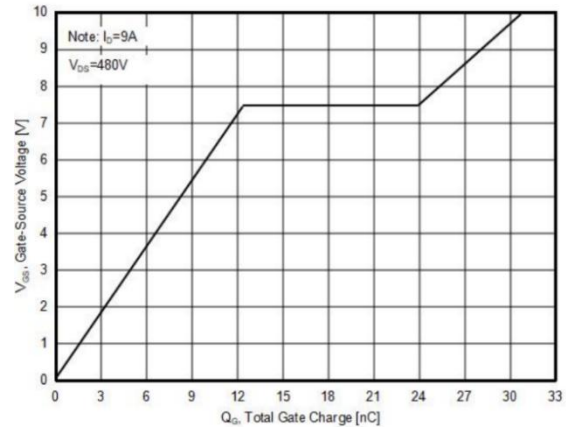


Figure9. Static drain-source on resistance

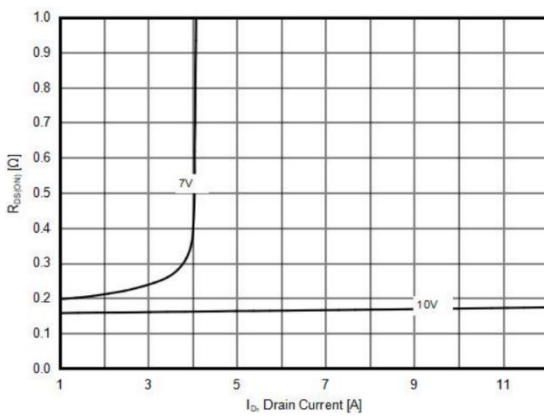
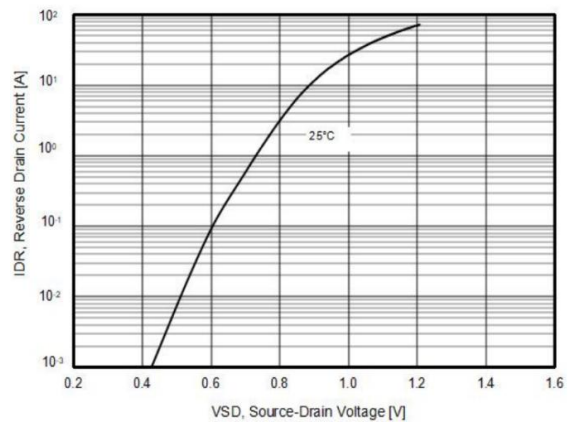
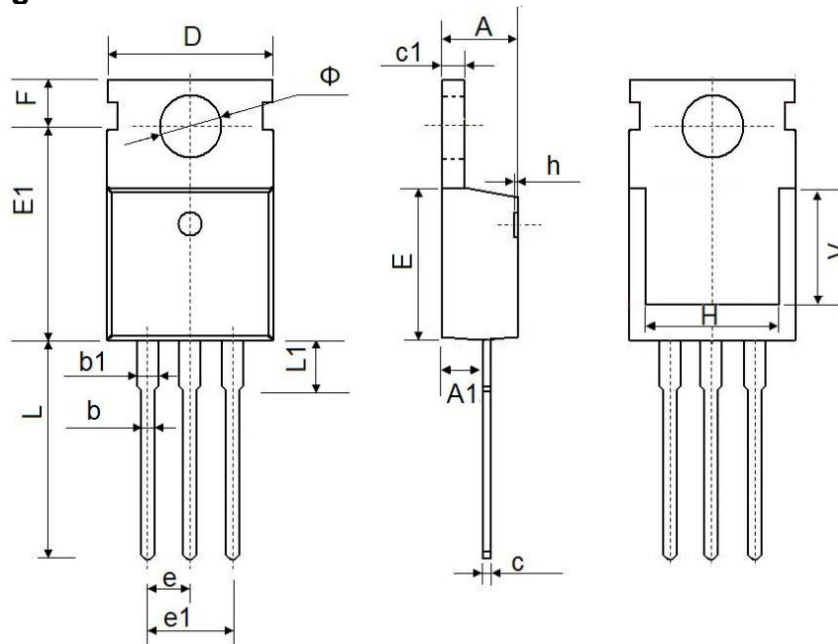


Figure10. Source-Drain Diode Forward Voltage



### TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.200	4.600	0.165	0.181
A1	2.250	2.550	0.089	0.100
b	0.700	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	8.950	10.250	0.352	0.404
E	8.950	10.040	0.352	0.395
E1	9.910	12.950	0.390	0.510
e	2.540 BSC.		0.100 BSC.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276REF.	
Φ	3.400	3.800	0.134	0.150