

Product Summary

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

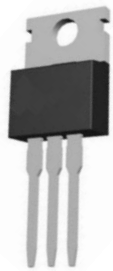
Feature

- Optimized body diode reverse recovery performance
- Low on-resistance and low conduction losses
- Ultra Low Gate Charge cause lower driving requirements
- Suffix "-Q1" for AEC-Q101

Application

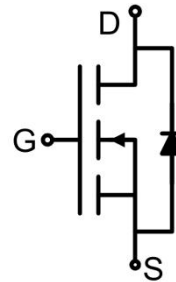
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)
- LLC Half-bridge

Package

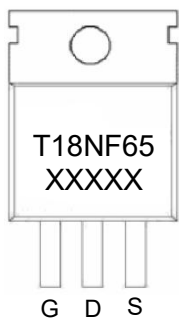


TO-220AB

Circuit diagram



Marking



Absolute maximum ratings (T_C=25°C unless otherwise noted)

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

Electrical characteristics (T_A=25 °C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650			V
Zero gate voltage drain current(T _C =25°C)	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V			10	μA
Zero gate voltage drain current(T _C =125°C)	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V			300	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.5	4.2	5.0	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 9A		165	190	mΩ
Dynamic characteristics³⁾						
Input Capacitance	C _{iss}	V _{DS} = 50V, V _{GS} = 0V, f = 1.0MHz		1550		pF
Output Capacitance	C _{oss}			60		
Reverse Transfer	C _{rss}			5		
Total Gate Charge	Q _g	V _{DS} = 480V, V _{GS} = 10V, I _D = 9A		30		nC
Gate-Source Charge	Q _{gs}			12.5		
Gate-Drain Charge	Q _{gd}			11		
Turn-on delay time	t _{d(on)}	V _{DD} = 380V, V _{GS} = 10V, I _D = 9A, R _G = 1.7Ω		43		nS
Turn-on rise time	t _r			17		
Turn-off delay time	t _{d(off)}			94		
Turn-off fall time	t _f			26		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	T _C = 25°C			18	A
Diode Forward voltage	V _{SD}	T _J = 25°C, V _{GS} = 0V, I _S = 18A			1.2	V
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 9A di/dt = 100A/μs		125		nS
Reverse Recovery Charge	Q _{rr}			0.51		uC
Peak Reverse Recovery Current	I _{rrm}			8.2		A

Notes:

1) Repetitive Rating: Pulse width limited by maximum junction temperature

2) T_J = 25°C, V_{DD} = 50V, V_G = 10V, R_G = 25Ω

3) Guaranteed by design, not subject to production

Typical Characteristics

Figure1. Safe operating area

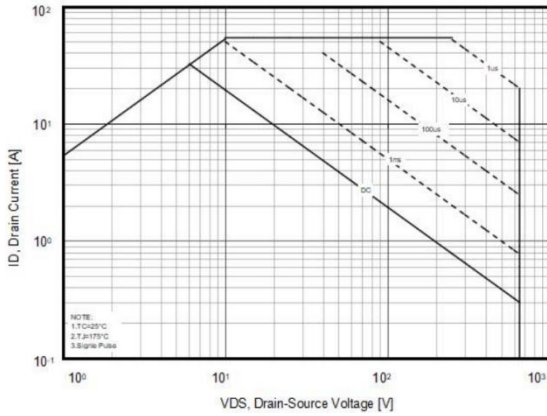


Figure2. Capacitance

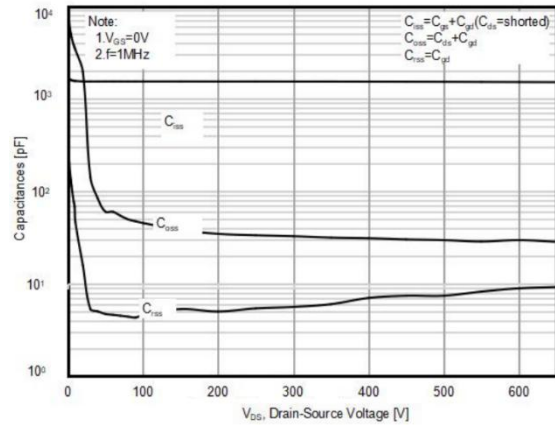


Figure3. Transfer characteristics

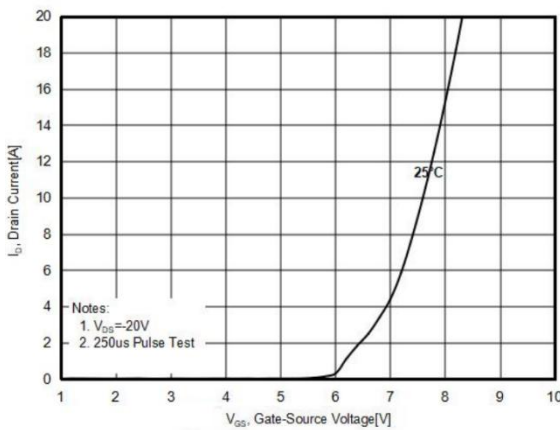


Figure4. Output characteristics

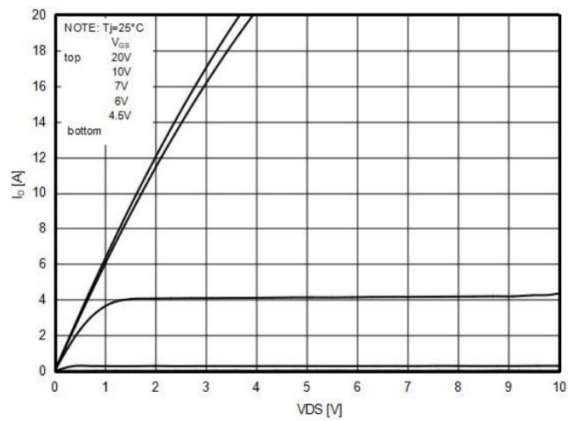


Figure5. R_{DS(ON)} vs Junction Temperature

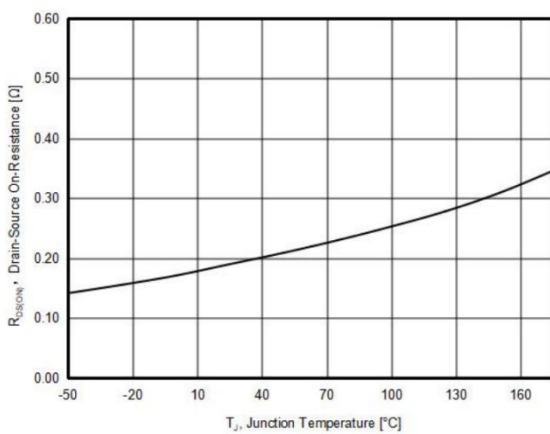
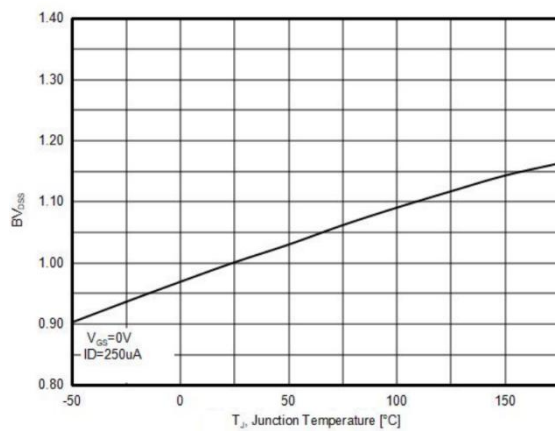


Figure6. BV_{DSS} vs Junction Temperature



Typical Characteristics

Figure7. Maximum I_D vs Junction Temperature

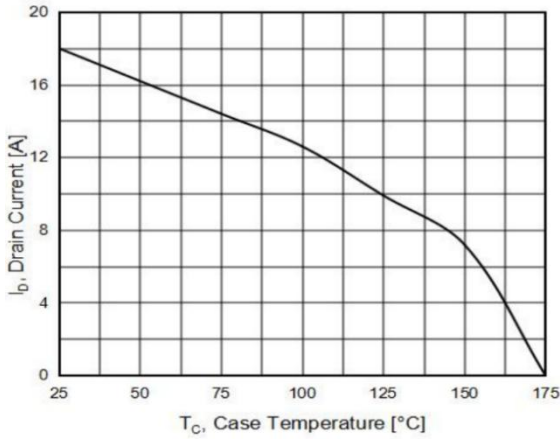


Figure8. Gate charge waveforms

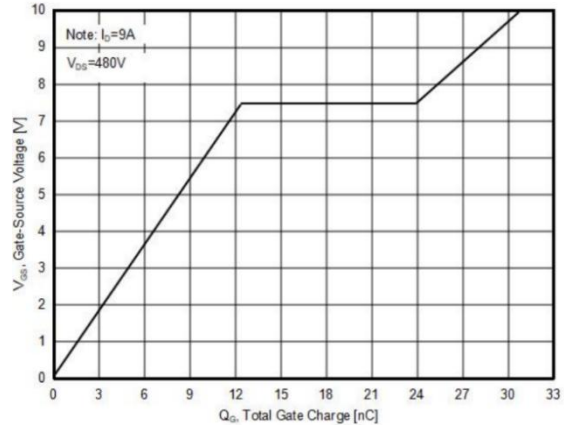


Figure9. Static drain-source on resistance

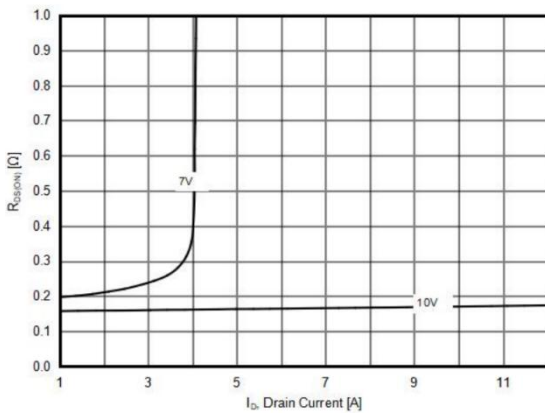
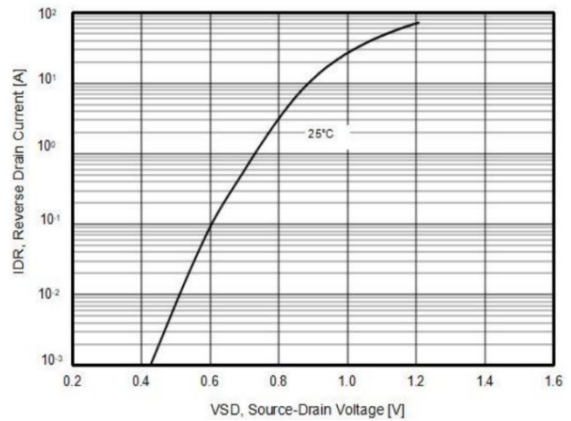
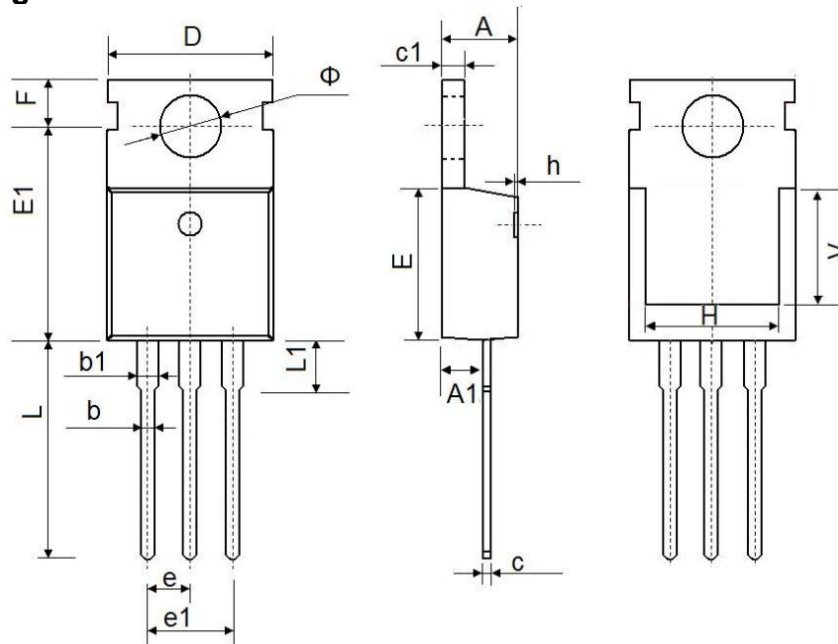


Figure10. Source-Drain Diode Forward Voltage



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.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150