

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
650V	68mΩ@10V	45A

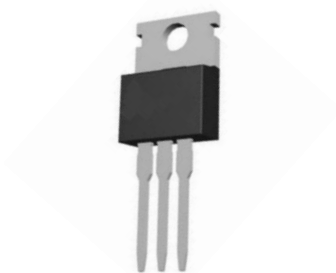
Feature

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

Application

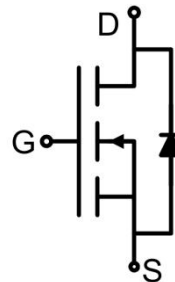
- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible Power Supply (UPS)
- LLC Half-bridge

Package



TO-220AB

Circuit diagram



Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V _{GS} = 0V)	V _{DS}	650	V
Gate-Source Voltage (V _{GS} = 0V) AC (f > 1Hz)	V _{GS}	±30	V
Gate-Source Voltage (V _{GS} = 0V) DC	V _{GS}	±20	V
Continuous Drain Current (T _C = 25°C)	I _D	45	A
Continuous Drain Current (T _C = 100°C)	I _D (100°C)	31.5	A
Pulsed Drain Current ¹⁾	I _{DM}	135	A
Power Dissipation (T _C = 25°C)	P _D	371	W
Thermal Resistance, Junction-to-Case	R _{θJC}	0.4	°C/W
Single pulse avalanche energy ²⁾	E _{AS}	400	mJ
Junction Temperature	T _J	175	°C
Storage Temperature	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 =1mA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V,V _{GS} =0V,T _C =25°C			10	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 =500μA	3.5	4.0	5.0	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =23A		60	68	mΩ
Dynamic characteristics ³⁾						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, f =1MHz		3900		pF
Output Capacitance	C _{oss}			132		
Reverse Transfer Capacitance	C _{rss}			14		
Total Gate Charge	Q _g	V _{DS} =480V, V _{GS} =10V, I _D =23A		65		nC
Gate-Source Charge	Q _{gs}			21		
Gate-Drain Charge	Q _{gd}			17		
Turn-on delay time	t _{d(on)}	V _{DD} =380V, V _{GS} =10V, I _D =23A, R _G =1.7Ω		42		nS
Turn-on rise time	t _r			14		
Turn-off delay time	t _{d(off)}			90		
Turn-off fall time	t _f			12		
Source-Drain Diode characteristics						
Diode Continuous Current	I _S	T _C =25°C			45	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =45A,T _J =25°C			1.2	V
Reverse recover time	T _{rr}	I _F =23A, di/dt =100A/us, T _J =25°C		173		nS
Reverse recovery charge	Q _{rr}			1.13		μC
Reverse Recovery Current	I _{rrm}			13		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 testing.

Typical Characteristics

Figure1. Safe operating area

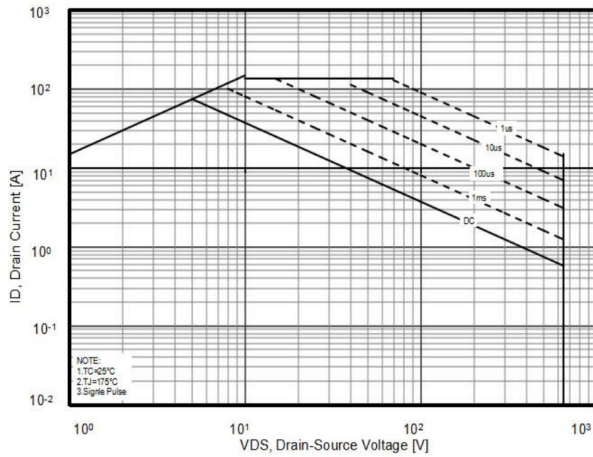


Figure2. Capacitance

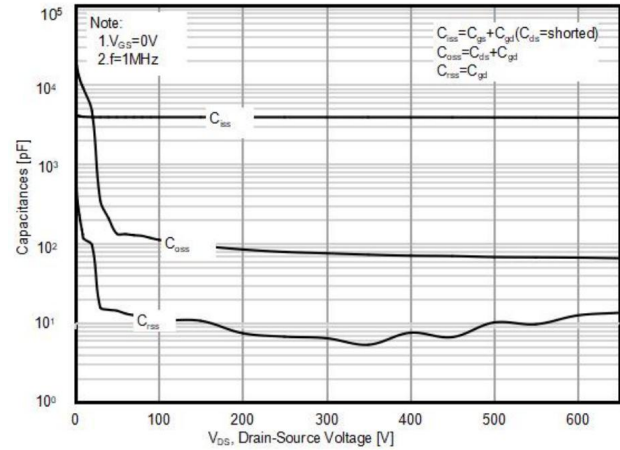


Figure3. Source-Drain Diode Forward Voltage

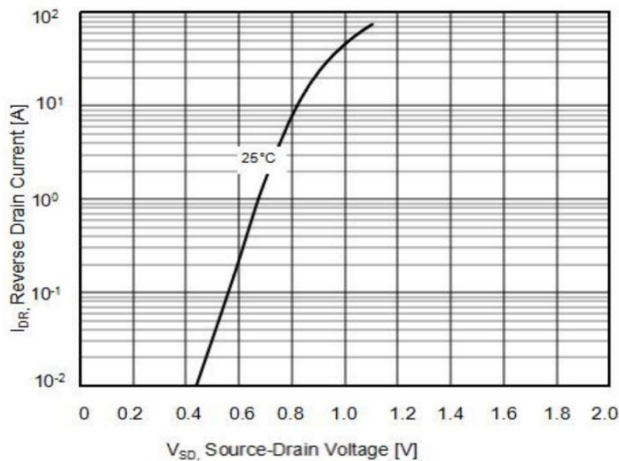


Figure4. Output characteristics

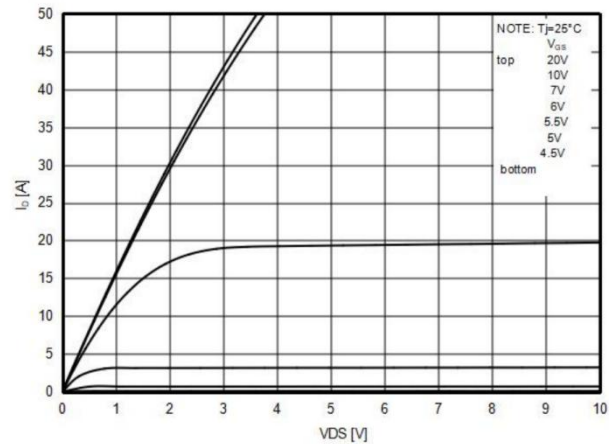


Figure5. $R_{DS(ON)}$ vs Junction Temperature

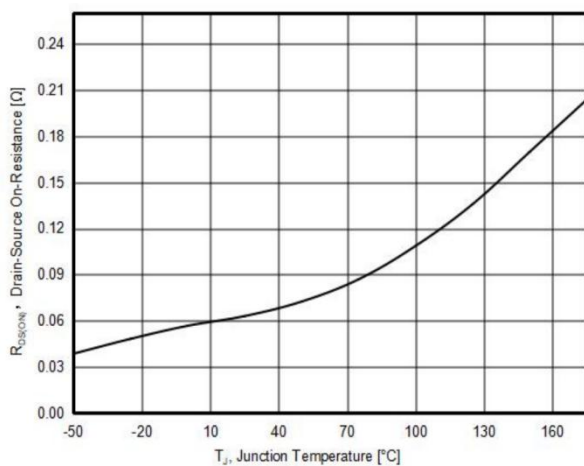
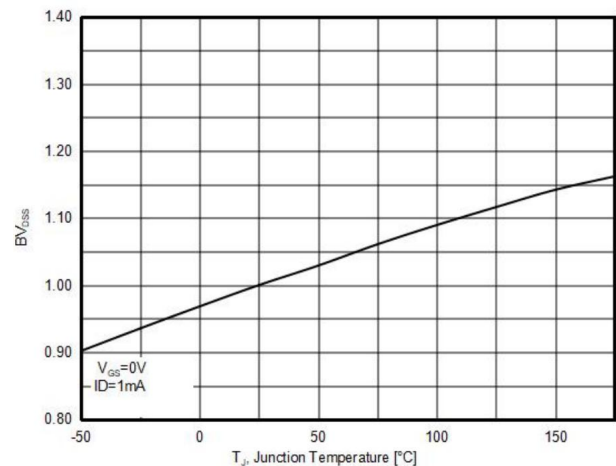


Figure6. BV_{DSS} vs Junction Temperature



Typical Characteristics

Figure7. Maximum I_D vs Junction Temperature

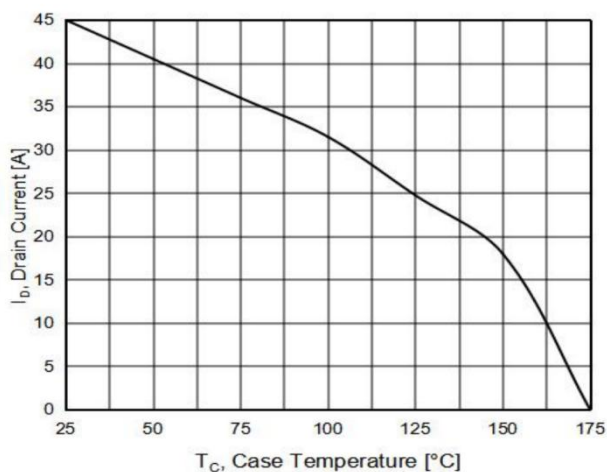


Figure8. Gate charge waveforms

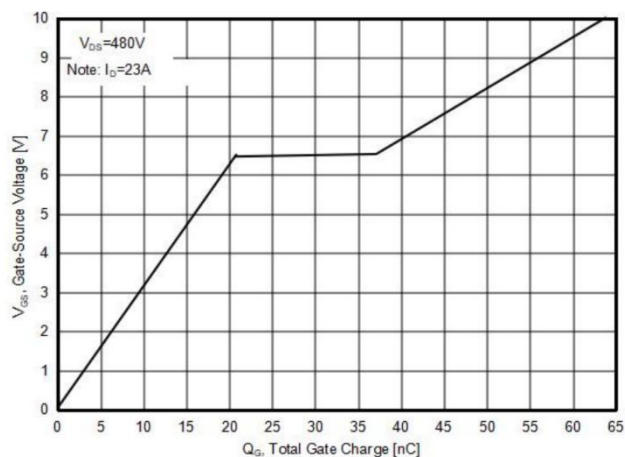


Figure9. Static drain-source on resistance

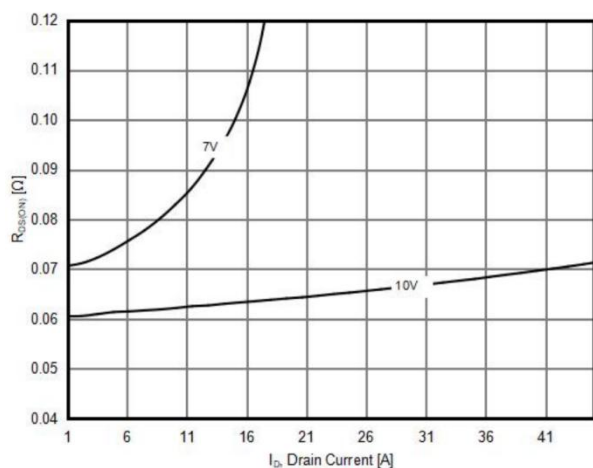
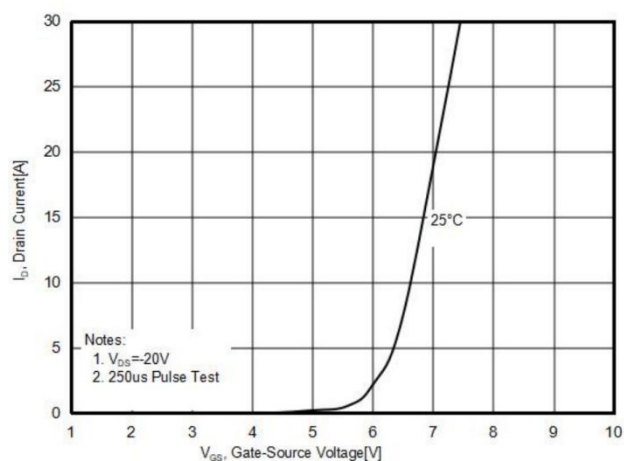
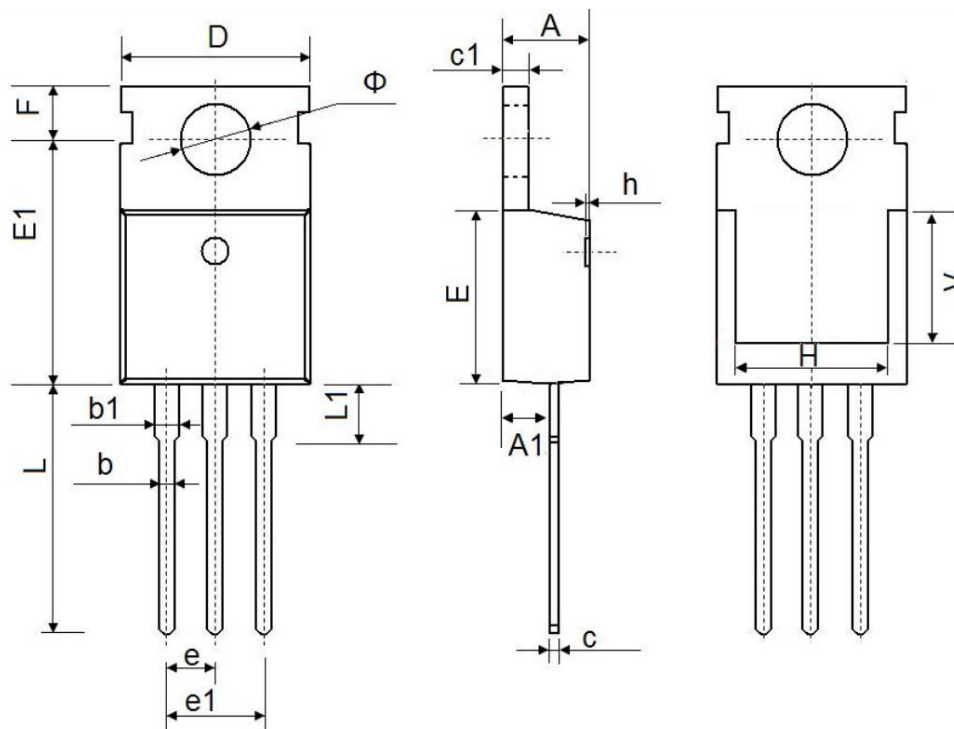


Figure10. Transfer characteristics



TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	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	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
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	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150