

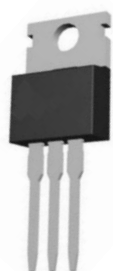
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
600V	55mΩ@10V	51A

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

Package

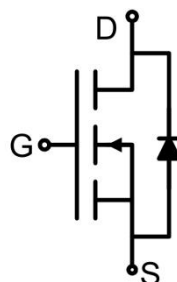


TO-220AB

Application

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

Circuit diagram



Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	600	V
Gate-Source Voltage (V _{DS} = 0V) AC (f > 1Hz)	V _{GS}	±30	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current	I _D	51	A
Continuous Drain Current (T _C = 100°C)	I _D (100°C)	35.7	A
Pulsed Drain Current ¹⁾	I _{DM}	153	A
Maximum Power Dissipation (T _C = 25°C)	P _D	378	W
De-rate above 25°C		2.52	W/°C
Thermal Resistance, Junction-to-Case	R _{θJC}	0.39	°C/W
Single pulse avalanche energy ²⁾	E _{AS}	576	mJ
Avalanche current ¹⁾	I _{AR}	12	A
Repetitive Avalanche energy, t _{AR} limited by T _{Jmax} ¹⁾	E _{AR}	0.9	mJ
Drain Source voltage slope, V _{DS} ≤ 480V	dv/dt	50	V/ns
Reverse diode dv/dt, V _{DS} ≤ 480V, I _{SD} < I _D	dv/dt	50	V/ns
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	600			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =600V,V _{GS} =0V, Tc=25°C			10	μA
		V _{DS} =600V,V _{GS} = 0V, Tc=125°C			300	
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	3.0	4.0	5.0	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =25A		50	55	mΩ
Dynamic characteristics ³⁾						
Input Capacitance	C _{iss}	V _{DS} =50V,V _{GS} =0V, f =1.0MHz		3836		pF
Output Capacitance	C _{oss}			155		
Reverse Transfer	C _{rss}			5.1		
Intrinsic Gate Resistance	R _G	f=1MHz open drain		2		Ω
Total Gate Charge	Q _g	V _{DS} =480V,V _{GS} =10V, I _D =25A		58		nC
Gate-Source Charge	Q _{gs}			22		
Gate-Drain Charge	Q _{gd}			15		
Gate plateau voltage	V _{gp}			6.6		V
Turn-on delay time	t _{d(on)}	V _{DD} =380V, V _{GS} =10V, I _D =25A,R _G =1.7Ω		32		nS
Turn-on rise time	t _r			14		
Turn-off delay time	t _{d(off)}			90		
Turn-off fall time	t _f			9		
Source-Drain Diode characteristics						
Diode Forward Current	I _{SD}	T _C =25°C			51	A
Source-drain current (Body Diode)	I _{SDM}				153	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =51A, T _j =25°C			1.2	V
Reverse Recovery Time	t _{rr}	I _F =25A,di/dt =100A/μs, T _j =25°C		140		nS
Reverse Recovery Charge	Q _{rr}			0.63		μC
Peak Reverse Recovery Current	I _{imm}			9		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

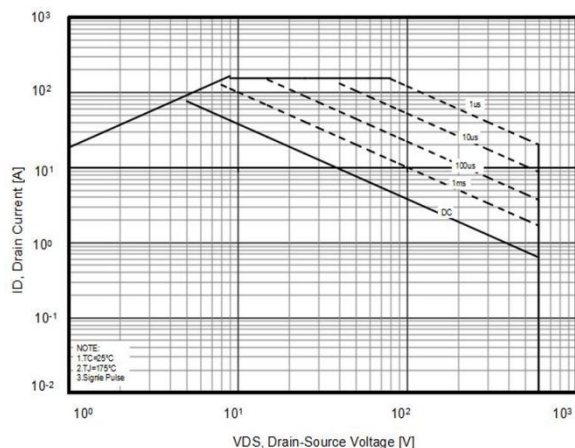


Figure2. Capacitance

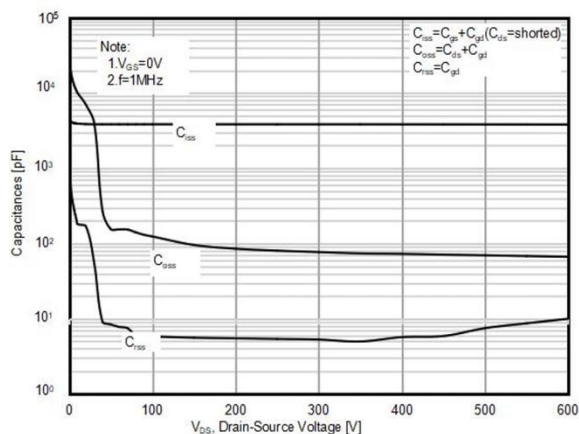


Figure3. Source-Drain Diode Forward Voltage

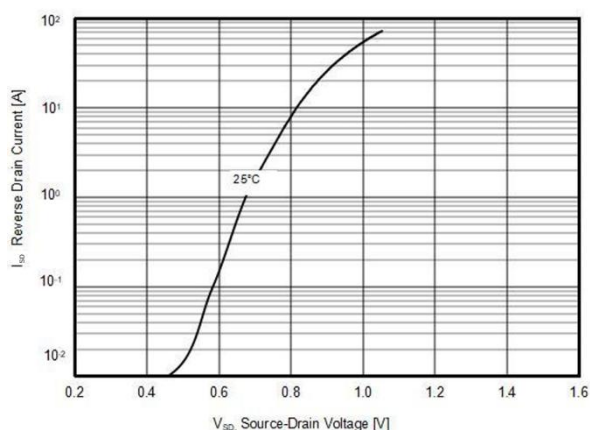


Figure4. Output characteristics

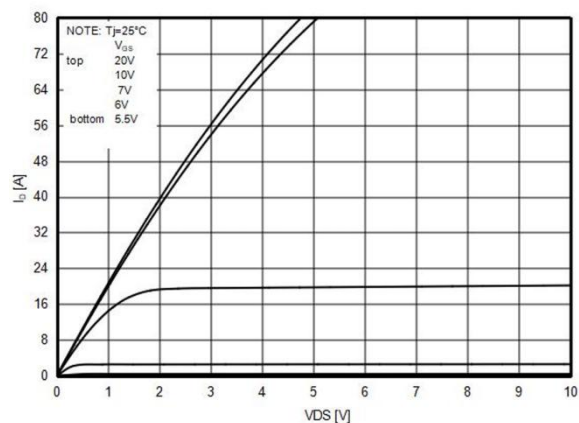


Figure5. $R_{DS(ON)}$ vs Junction Temperature

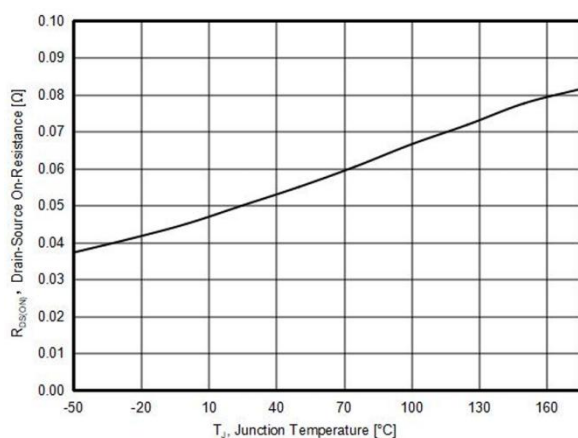
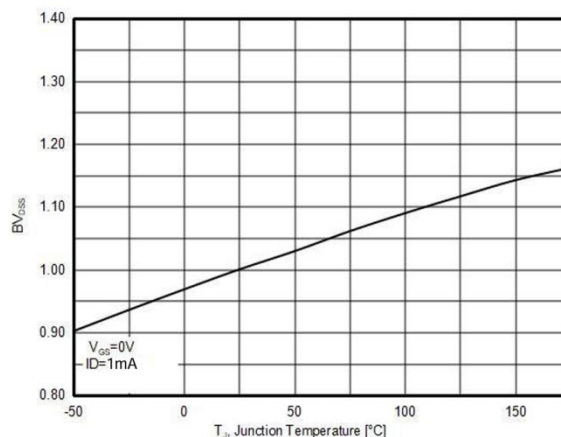


Figure6. BV_{DSS} vs Junction Temperature



Typical Characteristics

Figure7. Maximum I_D vs Junction Temperature

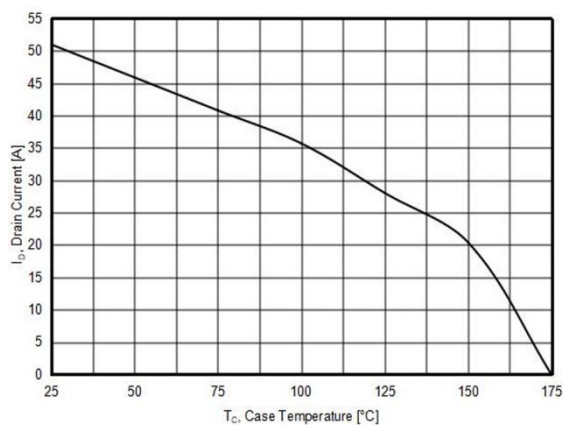


Figure8. Gate charge waveforms

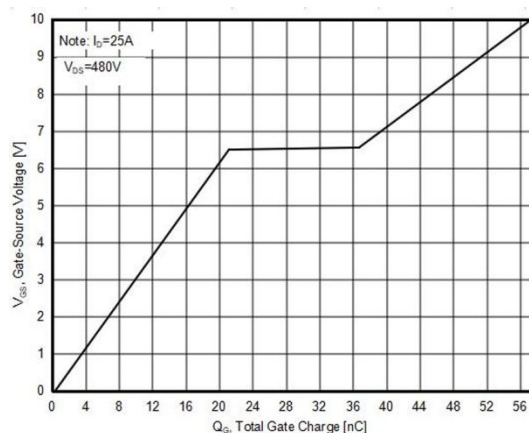


Figure9. Static drain-source on resistance

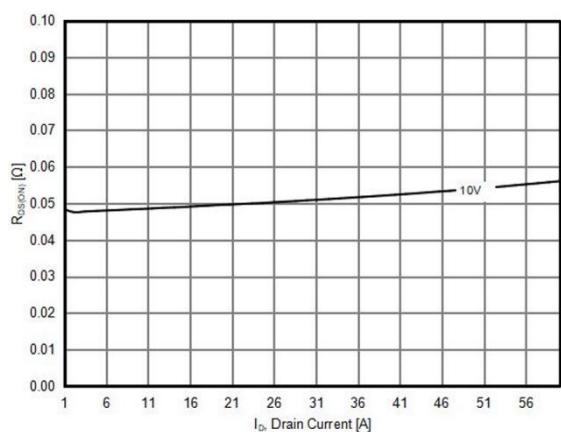
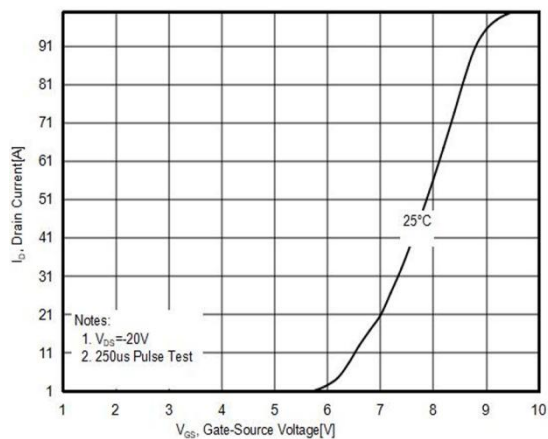
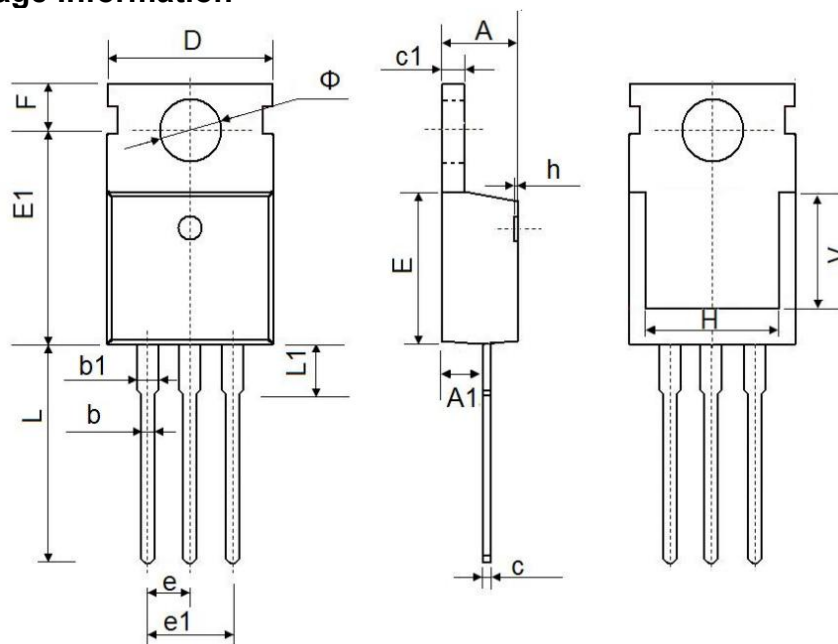


Figure10. Transfer characteristics



TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.200	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	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	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150