

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
650V	130mΩ@10V	26A

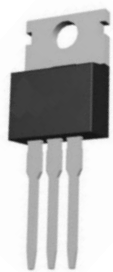
Feature

- 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
- Suffix "-Q1" for AEC-Q101

Application

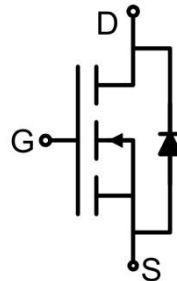
- Power factor correction(PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply(UPS)
- On-board charger(OBC)

Package

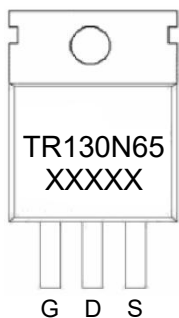


TO-220AB

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 (V _{DS} = 0V) AC (f > 1Hz)	V _{GS}	±30	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current	I _D	26	A
Continuous Drain Current (T _C = 100°C)	I _D (100°C)	18.2	A
Pulsed Drain Current ¹⁾	I _{DM}	78	A
Maximum Power Dissipation (T _C = 25°C)	P _D	237	W
De-rate above 25°C		1.58	W/°C
Thermal Resistance, Junction-to-Case	R _{θJC}	0.63	°C/W
Avalanche current ¹⁾	I _{AS}	7	A
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 = 250μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V, T _C = 25°C			10	μA
		V _{DS} = 650V, V _{GS} = 0V, T _C = 125°C			400	
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	4.2	5.0	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 13A		110	130	mΩ
Dynamic characteristics²⁾						
Input Capacitance	C _{iss}	V _{DS} = 50V, V _{GS} = 0V, f = 1.0MHz		2161		pF
Output Capacitance	C _{oss}			95		
Reverse Transfer	C _{rss}			50		
Intrinsic Gate Resistance	R _G	f = 1MHz open drain		1.5		Ω
Total Gate Charge	Q _g	V _{DS} = 480V, V _{GS} = 10V, I _D = 13A		41.2		nC
Gate-Source Charge	Q _{gs}			16.3		
Gate-Drain Charge	Q _{gd}			12.8		
Gate plateau voltage	V _{gp}			7		V
Turn-on delay time	t _{d(on)}	V _{DD} = 380V, V _{GS} = 10V, I _D = 13A, R _G = 1.7Ω		43		nS
Turn-on rise time	t _r			16		
Turn-off delay time	t _{d(off)}			93		
Turn-off fall time	t _f			20		
Source-Drain Diode characteristics						
Diode Forward Current	I _{SD}	T _C = 25°C			26	A
Source-drain current (Body Diode)	I _{SDM}				78	A
Diode Forward voltage	V _{SD}	V _{GS} = 0V, I _{SD} = 26A, T _J = 25°C			1.2	V
Reverse Recovery Time	t _{rr}	I _F = 13A, di/dt = 100A/μs, T _J = 25°C		1.45		nS
Reverse Recovery Charge	Q _{rr}			0.725		μC
Peak Reverse Recovery Current	I _{mm}			10		A

Notes:

- 1) Repetitive Rating: Pulse width limited by maximum junction temperature.
 2) Guaranteed by design, not subject to production

Typical Characteristics

Figure1. Safe operating area

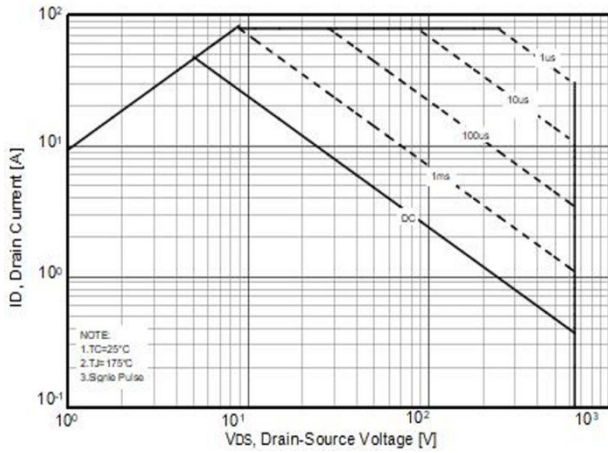


Figure2. Capacitance

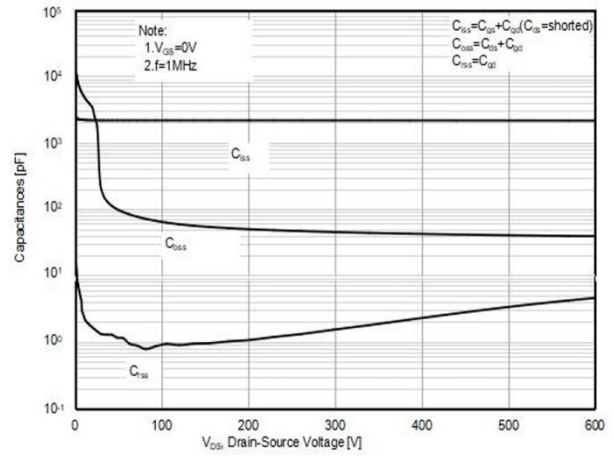


Figure3. Output characteristics

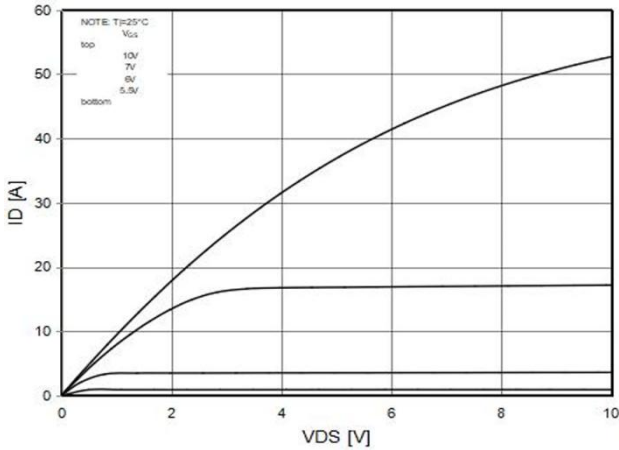


Figure4. Source-Drain Diode Forward Voltage

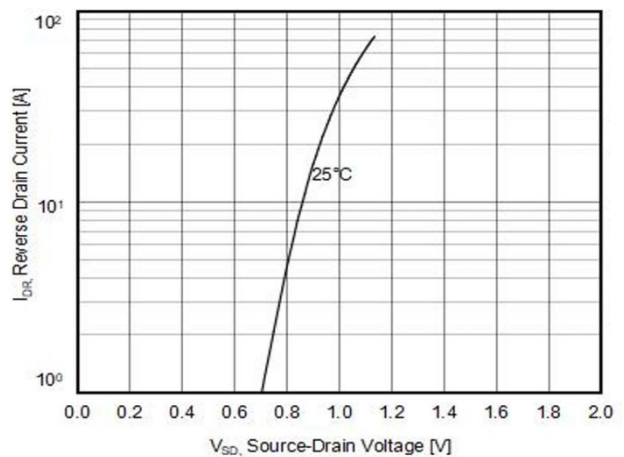


Figure5. Static drain-source on resistance

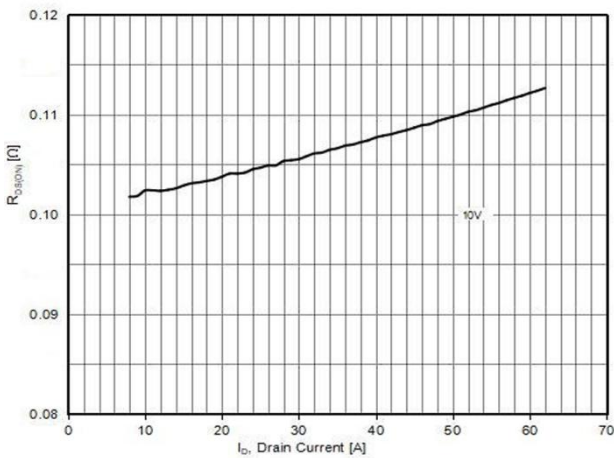
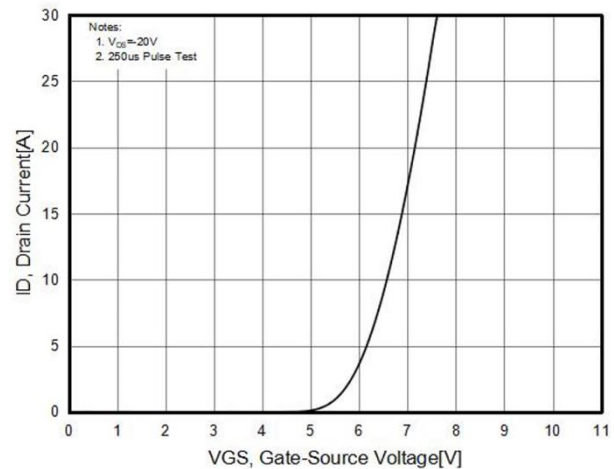


Figure6. Transfer characteristics



Typical Characteristics

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

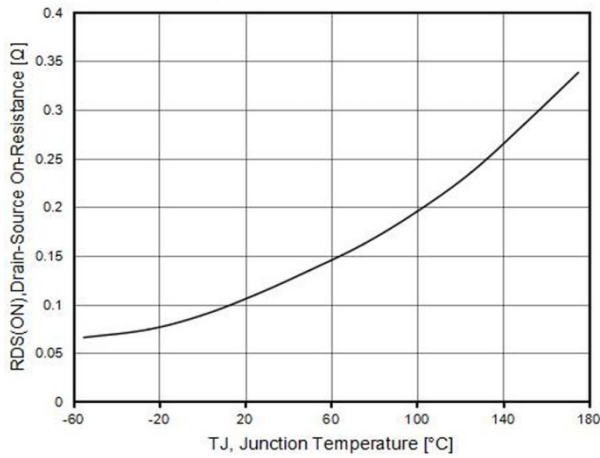


Figure8. BV_{DSS} vs Junction Temperature

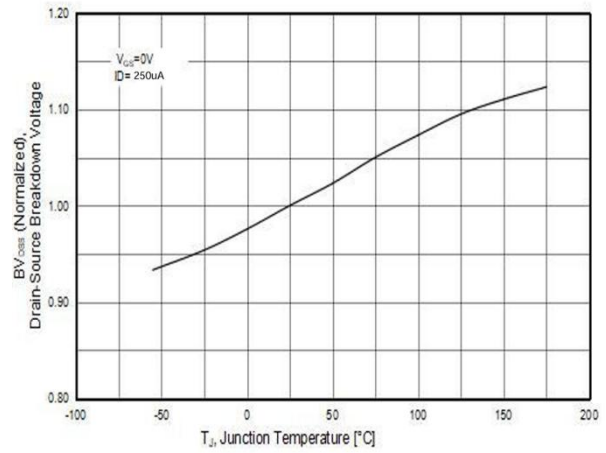


Figure9. Gate charge waveforms

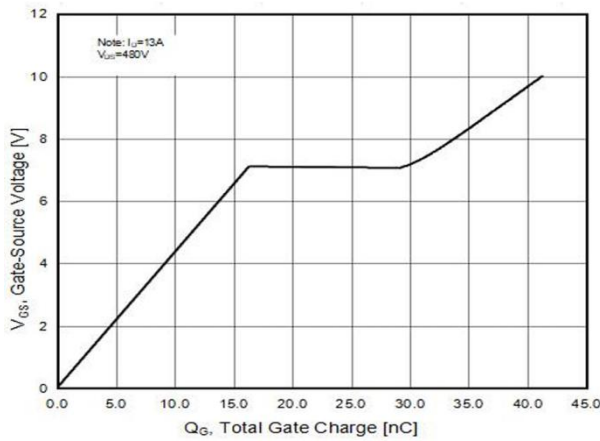
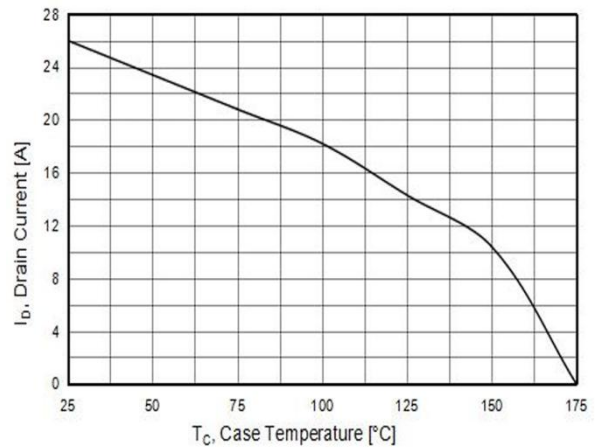
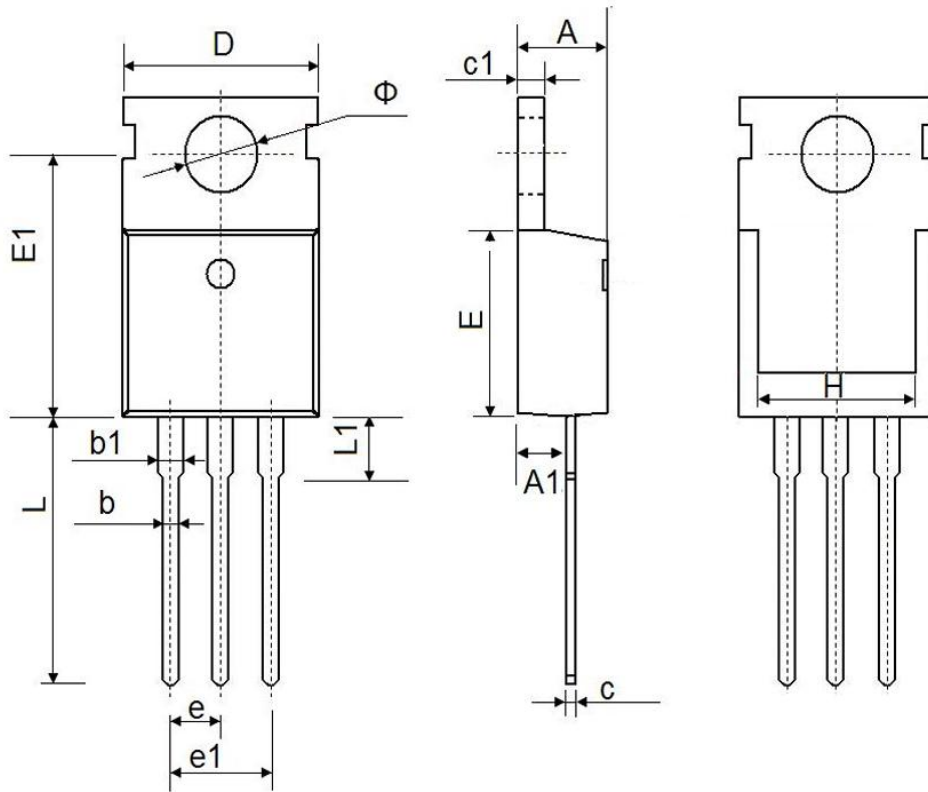


Figure10. Maximum I_D vs Junction Temperature

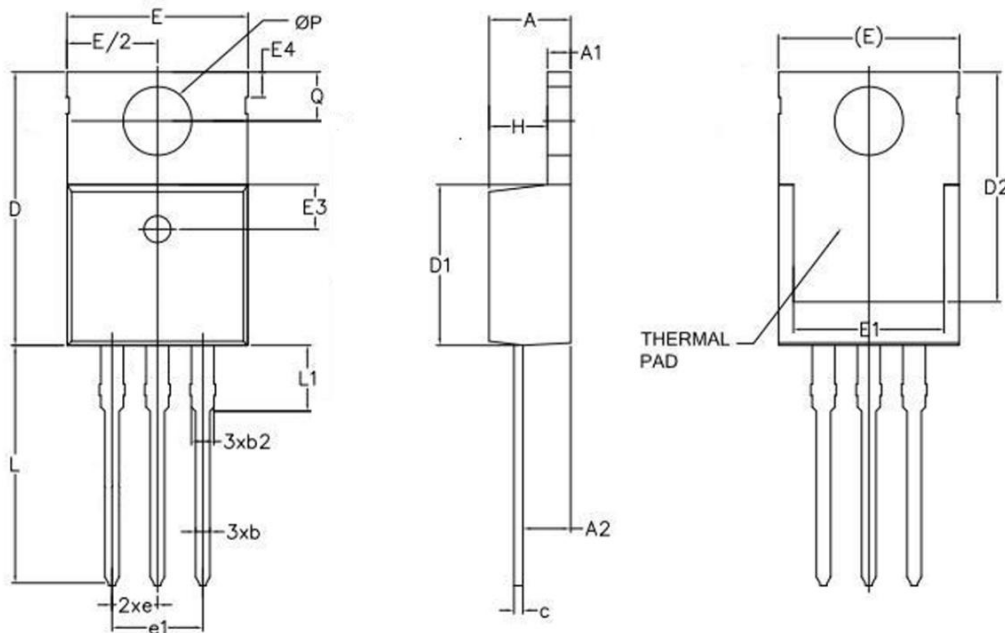


TO-220AB Package Information



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	9.750	0.352	0.384
E	9.740	10.040	0.352	0.384
E1	9.910	10.250	0.390	0.404
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
H	7.900	8.100	0.311	0.319
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
Φ	3.400	3.800	0.134	0.150

TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	1.200	1.400	0.047	0.055
A2	2.350	2.900	0.093	0.114
b	0.710	0.910	0.028	0.036
b2	1.220	1.360	0.048	0.054
c	0.470	0.600	0.019	0.024
D	14.700	15.800	0.579	0.622
D1	8.900	9.470	0.350	0.373
D2	11.750	13.600	0.463	0.535
E	9.700	10.370	0.382	0.408
E1	7.000	8.890	0.276	0.350
E3	2.400	2.600	0.094	0.102
E4	1.270	1.570	0.050	0.062
e	2.540 BSC.		0.100 BSC.	
e1	5.080 BSC.		0.200 BSC.	
H	3.000	3.400	0.118	0.134
L	12.900	14.800	0.508	0.583
L1	2.540	3.840	0.100	0.151
ØP	3.600	3.900	0.142	0.154
Q	4.600	4.900	0.181	0.193