

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
40V	2.9mΩ@10V	150A
	4.5mΩ@4.5V	

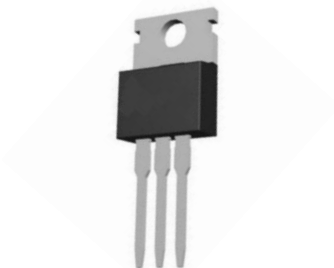
Feature

- Advanced trench technology
- Excellent $R_{DS(on)}$
- Low gate charge

Application

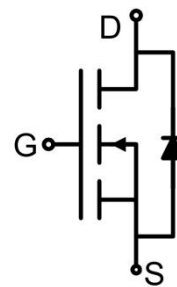
- Battery protection
- Load switch
- Uninterruptible power supply

Package



TO-220AB

Circuit diagram



Marking



Absolute maximum ratings($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ¹⁾ ($V_{GS}=10\text{V}$)	I_D	150	A
Continuous Drain Current ¹⁾ ($V_{GS}=10\text{V}$, $T_C=100^{\circ}\text{C}$)	$I_D (100^{\circ}\text{C})$	102	A
Pulsed Drain Current ²⁾	I_{DM}	576	A
Single Pulse Avalanche Energy ³⁾	E_{AS}	576	mJ
Power Dissipation ⁴⁾	P_D	57	W
Thermal Resistance from Junction to Case ¹⁾	$R_{\theta JC}$	2.2	$^{\circ}\text{C/W}$
Operating Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

Electrical characteristics ($T_J=25^{\circ}\text{C}$, 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	40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.8	2.5	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		2.4	2.9	mΩ
		V _{GS} =4.5V, I _D =20A		3.5	4.5	
Dynamic characteristics ⁵⁾						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f =1MHz		6460		pF
Output Capacitance	C _{oss}			455		
Reverse Transfer Capacitance	C _{rss}			276		
Total Gate Charge	Q _g	V _{DS} =20V, V _{GS} =10V, I _D =20A		112		nC
Gate-Source Charge	Q _{gs}			16.7		
Gate-Drain Charge	Q _{gd}			26.5		
Turn-on delay time	t _{d(on)}	V _{DS} =20V, V _{GS} =10V R _G =3Ω, R _L =1Ω		18		nS
Turn-on rise time	t _r			4.4		
Turn-off delay time	t _{d(off)}			67		
Turn-off fall time	t _f			9.5		
Source-Drain Diode characteristics						
Diode Continuous Current	I _S				150	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =20A			1.2	V
Reverse recover time	T _{rr}	I _F =20A, di/dt =500A/us		6		nS
Reverse recovery charge	Q _{rr}			14		nC

Notes:

- 1) The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2) The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- 3) The EAS data shows Max. rating. The test condition is $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $I_{AS}=20\text{A}$.
- 4) The power dissipation is limited by 150°C junction temperature.
- 5) Guaranteed by design, not subject to production testing.

Typical Characteristics

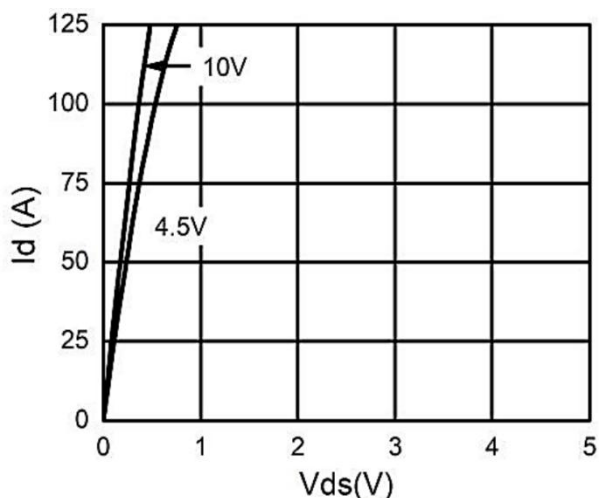


Figure 1. Output Characteristics

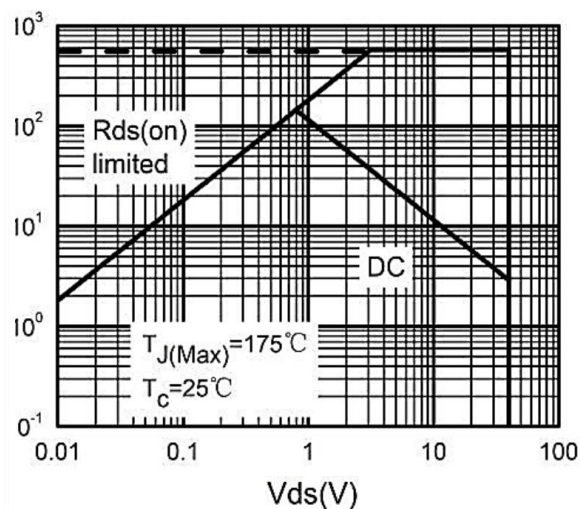


Figure 2 . Maximum Safe Operating Area

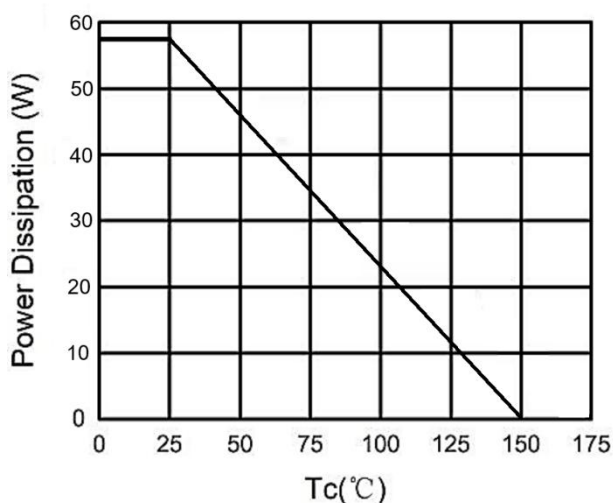


Figure 3. Power Dissipation

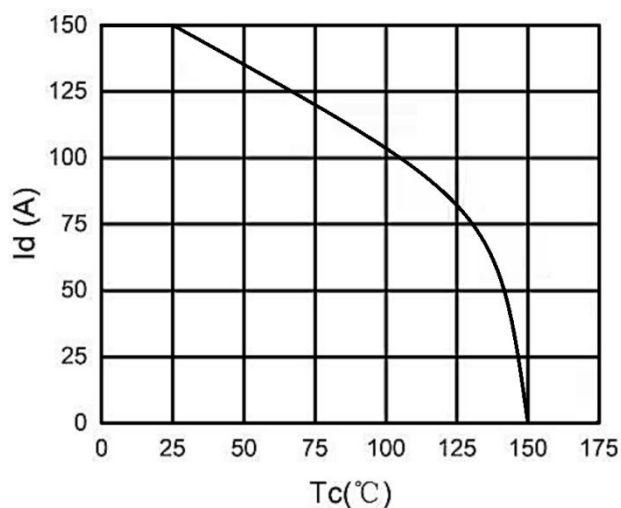


Figure 4. Drain Current

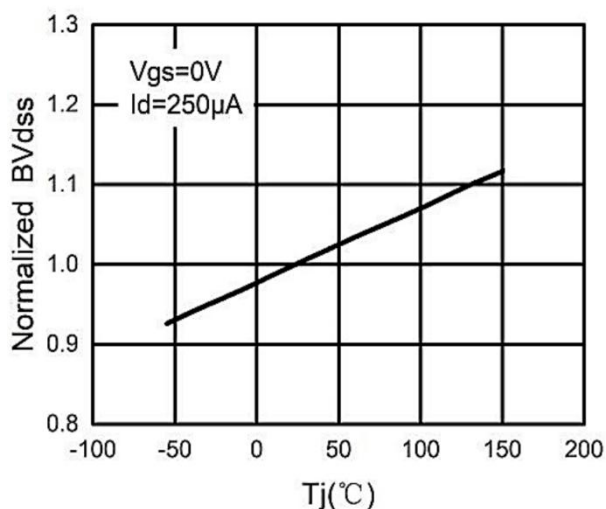


Figure 5. BV_{DSS} vs Junction Temperature

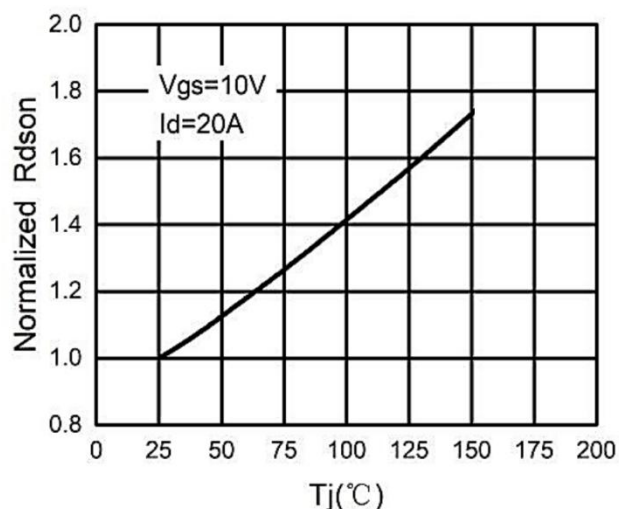


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

Typical Characteristics

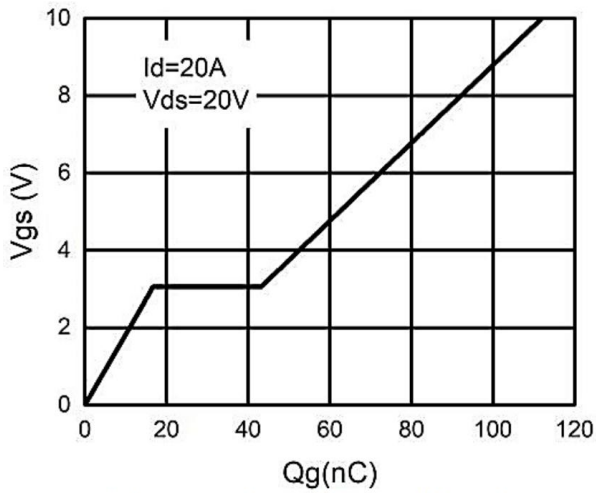


Figure 7. Gate Charge Waveforms

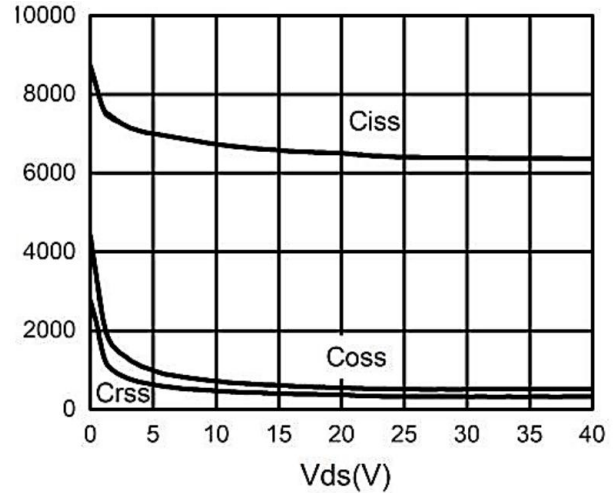


Figure 8. Capacitance

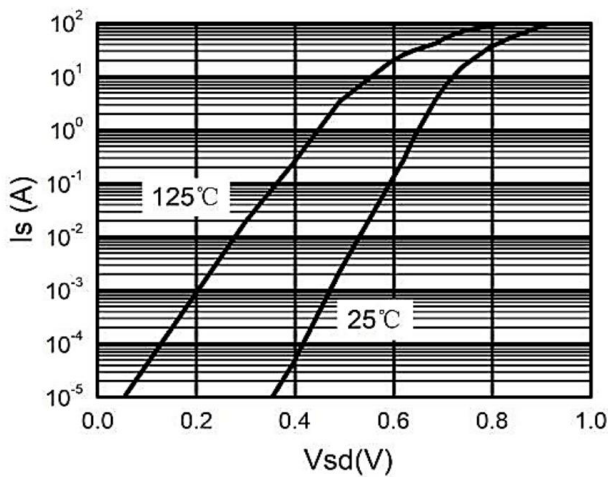


Figure 9. Body-Diode Characteristics

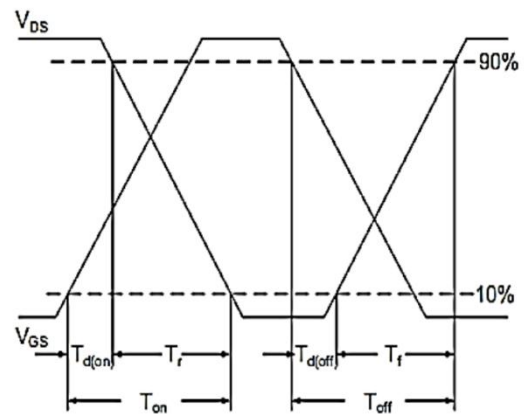


Figure 10. Switching Time Waveform

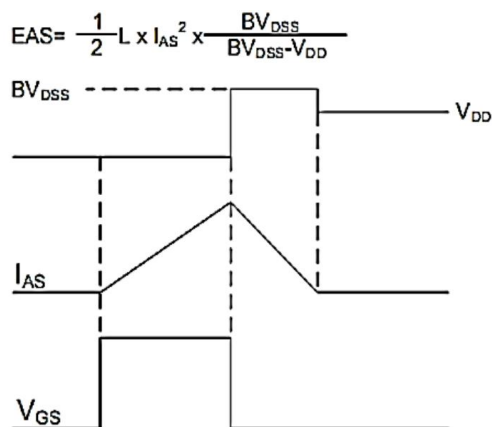
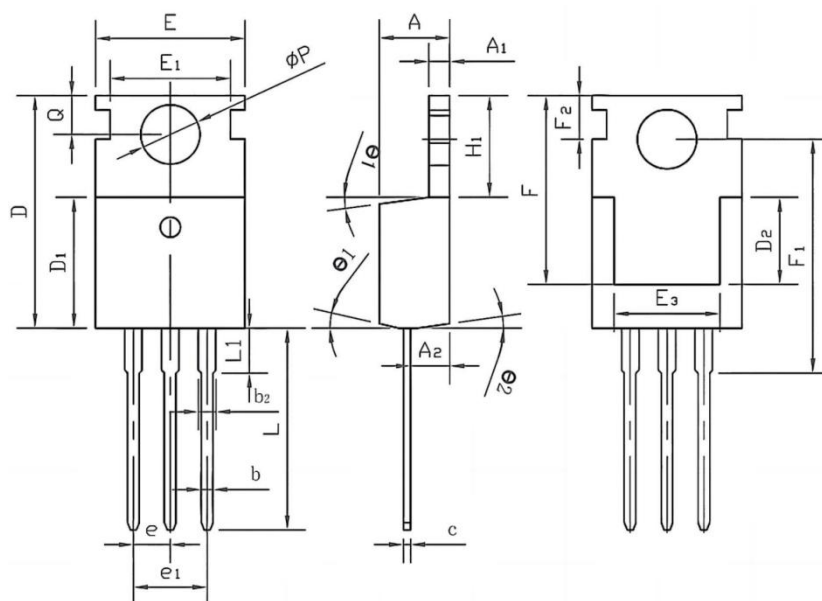


Figure 11. Unclamped Inductive Switching wave

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.270	4.870	0.168	0.192
A1	1.150	1.450	0.045	0.057
A2	2.100	2.700	0.083	0.106
b	0.700	1.000	0.028	0.039
b2	1.170	1.500	0.046	0.059
D	0.400	0.650	0.016	0.026
D1	8.800	9.400	0.346	0.370
D2	5.700	7.000	0.224	0.276
E	9.700	10.300	0.382	0.406
E1	8.700 REF.		0.343 REF.	
E2	9.630	10.350	0.379	0.407
E3	7.000	8.400	0.276	0.331
e	0.370 BSC.		0.015 BSC.	
e1	0.100 BSC.		0.004 BSC.	
H1	6.000	6.850	0.236	0.270
L	12.750	13.900	0.502	0.547
L1	-	3.400	-	0.134
φ p	3.450	3.750	0.136	0.148
Q	2.600	3.000	0.102	0.118
θ1	4°	10°	4°	10°
θ2	0°	6°	0°	6°
F	13.300	13.700	0.524	0.539
F1	15.500	16.300	0.610	0.642
F2	2.800	3.200	0.110	0.126