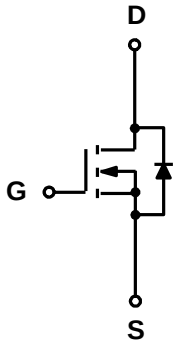
AP60N25

N-Channel Enhancement Mosfet

DATA SHEET

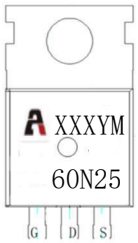
Features

- 250V,60A
  $R_{DS(ON)}$ <33mΩ @V_{GS}=10V TYP:28mΩ
- Advanced Trench Technology
- Excellent RDS(ON) and Low gate charge



Applications

- Uninterrupted Power Supply (UPS)
- Brushless DC electric motor (BLDC)



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
60N25	AP60N25	TO-220	-	-	1000

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	250	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current (T_C =25℃) (1)	I_D	60	A
Continuous Drain Current (T_C=100℃) (1)	I_D	40	A
Pulsed Drain Current (1,2,3)	I_{DM}	230	A
Single Pulsed Avalanche Energy	E_{AS}	300	mJ
Avalanche Energy, Repetitive	E_{AR}	75	mJ
Drain Power Dissipation	P_D	278	W
Peak Diode Recovery dv/dt	dv/dt	5.0	V/ns
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.45	℃/W
Thermal Resistance- Junction to Ambient	$R_{\theta JA}$	60	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25℃ unless otherwise noted)

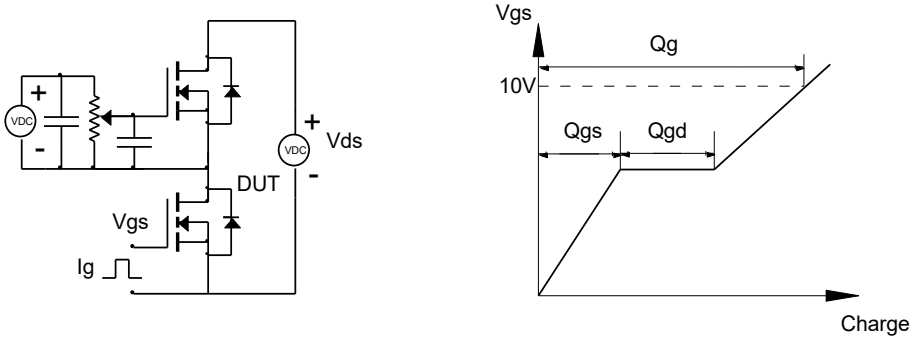
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	250	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =250V, V_{GS} = 0V	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	3.6	-	5.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =35A	-	28	33	mΩ
Forward Trans conductance	G_{fs}	VGS=10V, ID=35A	100			S
Gate Resistance	R_G	VGS=0V VDS open f=1.0MH		1.5		Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =25V, V_{GS} =0V, f =1.0MHz	-	7000	-	pF
Output Capacitance	C_{oss}		-	480	-	
Reverse Transfer Capacitance	C_{rss}		-	210	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=50V, I_D=35A, R_G=2.5Ω, V_G=10V	-	45	-	ns
Turn-on rise time	t_r		-	70	-	
Turn-off delay time	$t_{d(off)}$		-	110	-	
Turn-off fall time	t_f		-	90	-	
Total Gate Charge	Qg	V_{DS}=100V, I_D=35A, V_{GS}=10V	-	200	-	nC
Gate-Source Charge	Qgs		-	28	-	
Gate-Drain Charge	Qgd		-	60	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	T_C=25℃, V_{GS} =0V, I_S=35A	-	-	1.2	V
Diode Forward current	I_S	T_C=25℃	-	-	50	A
Body Diode Reverse Recovery Time	trr	T_C=25℃，IF=30A,di/dt=100A/us		120		ns
Body Diode Reverse Recovery Charge	Qrr	T_C=25℃，IF=30A,di/dt=100A/us		0.55		nc

Notes:

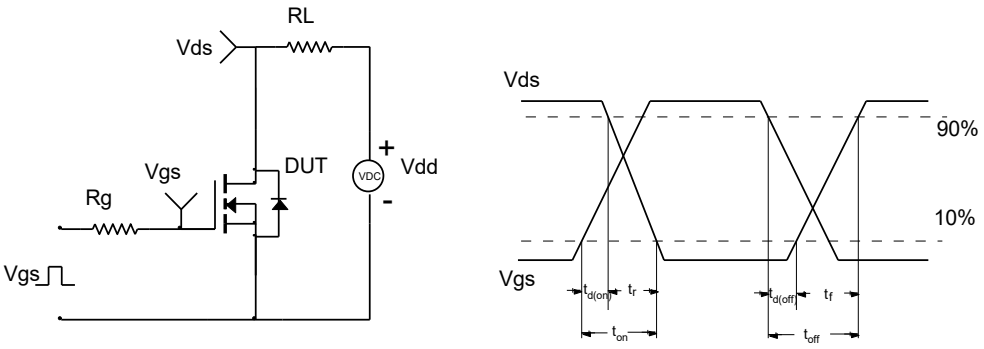
1. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2. The EAS data shows Max. rating. IAS=35A, RG=25Ω, VDD=50V, VGS=10V, Starting TJ=25℃.
3. The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%.
4. The power dissipation is limited by 150℃ junction temperature.
5. The data is theoretically the same as ID and IDM, in real applications, should be limited by total power dissipation.

Test Circuit

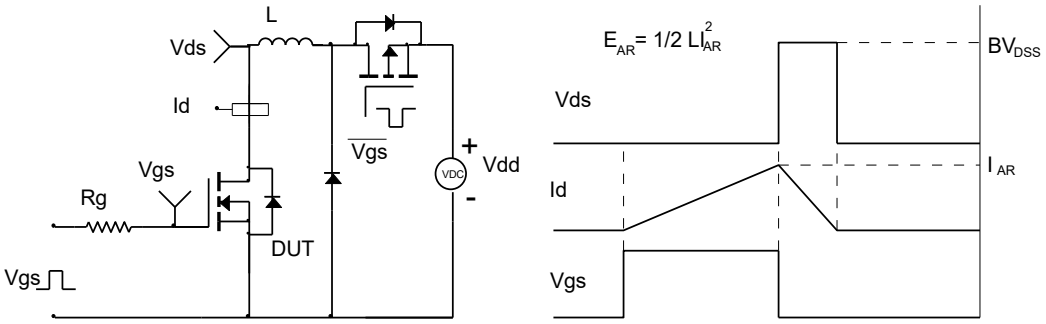
Gate Charge Test Circuit & Waveform



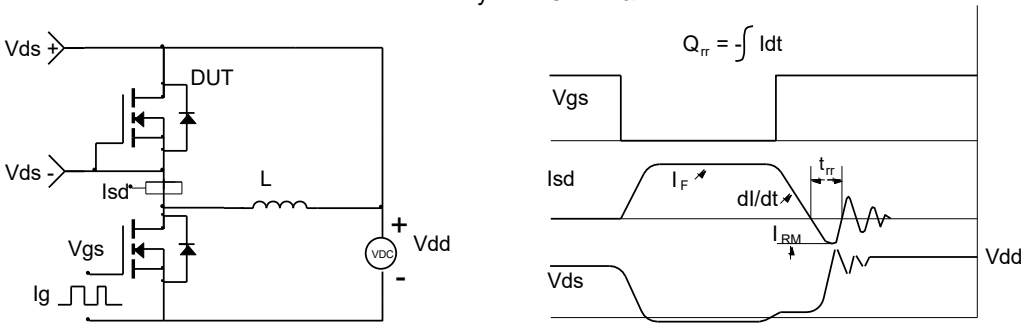
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Characteristics

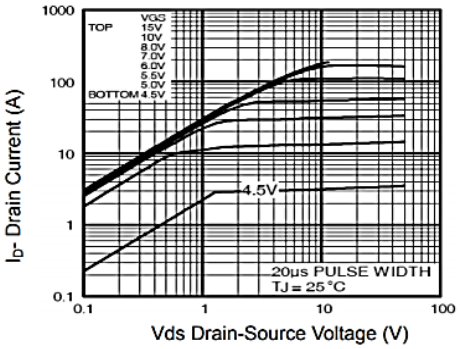


Figure 1 Output Characteristics

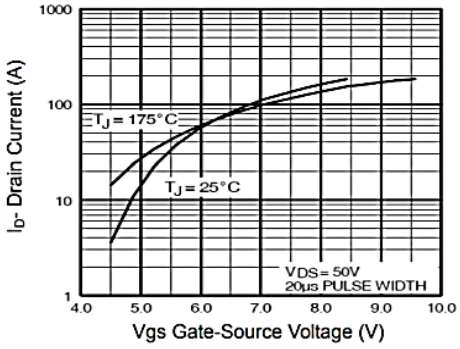


Figure 2 Transfer Characteristics

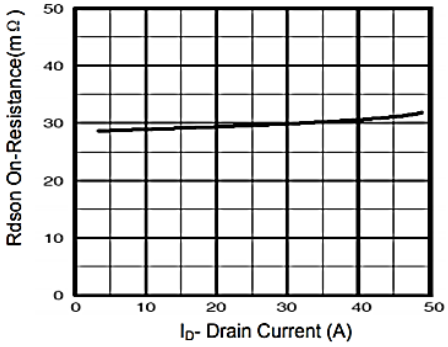


Figure 3 Rdson- Drain Current

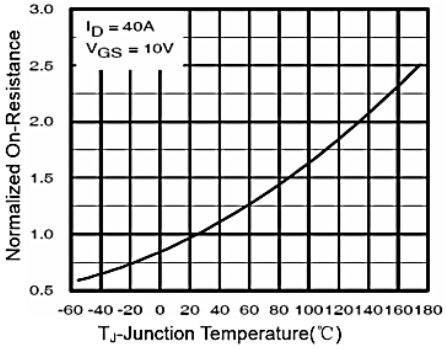


Figure 4 Rdson-JunctionTemperature

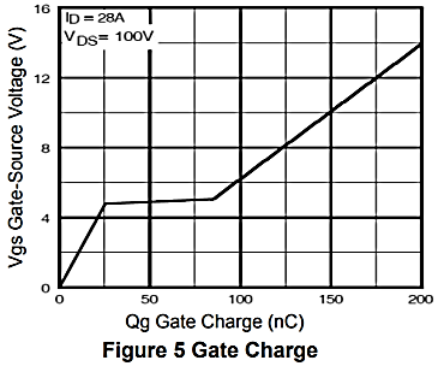


Figure 5 Gate Charge

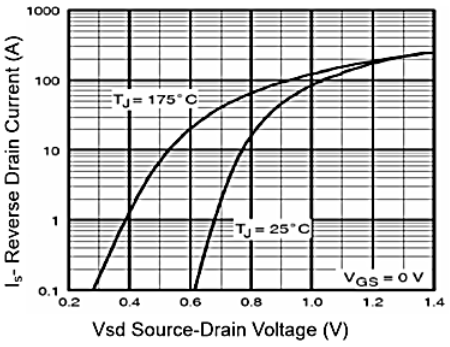


Figure 6 Source- Drain Diode Forward

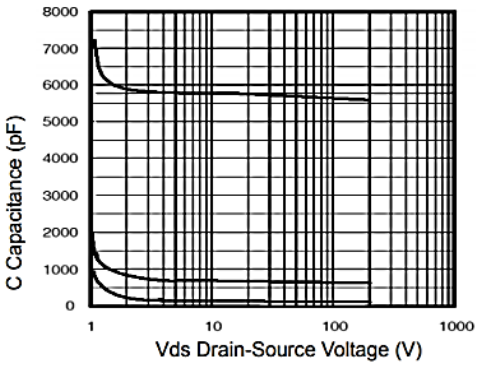


Figure 7 Capacitance vs Vds

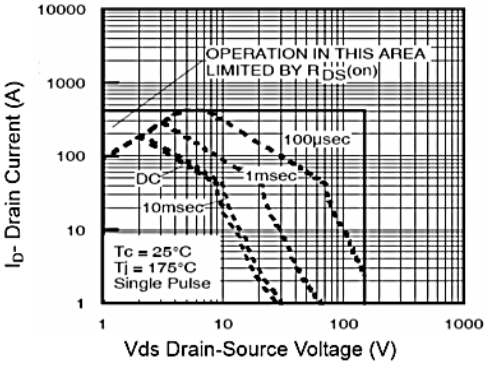


Figure 8 Safe Operation Area

Typical Characteristics

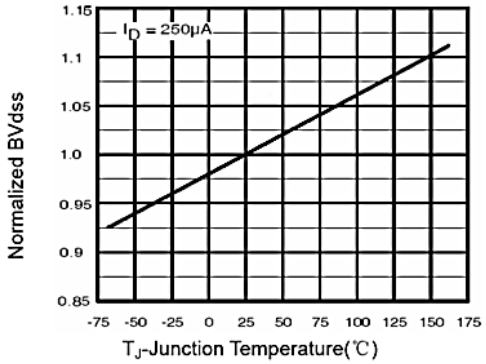


Figure 9 BV_{DSS} vs Junction Temperature

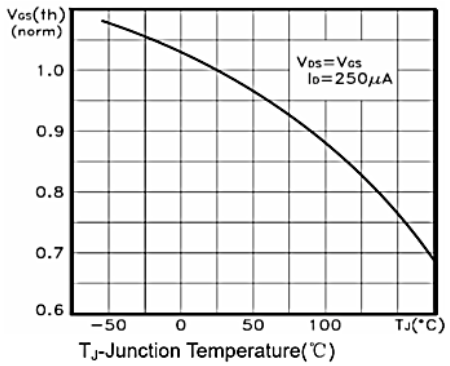


Figure 10 $V_{GS(th)}$ vs Junction Temperature

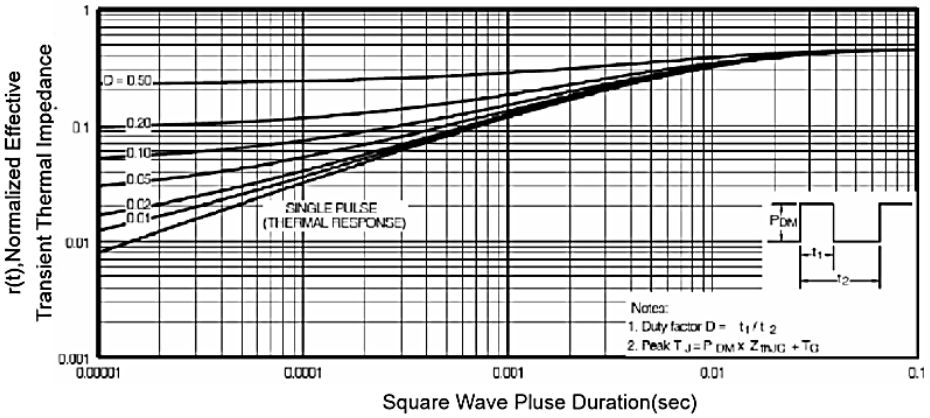
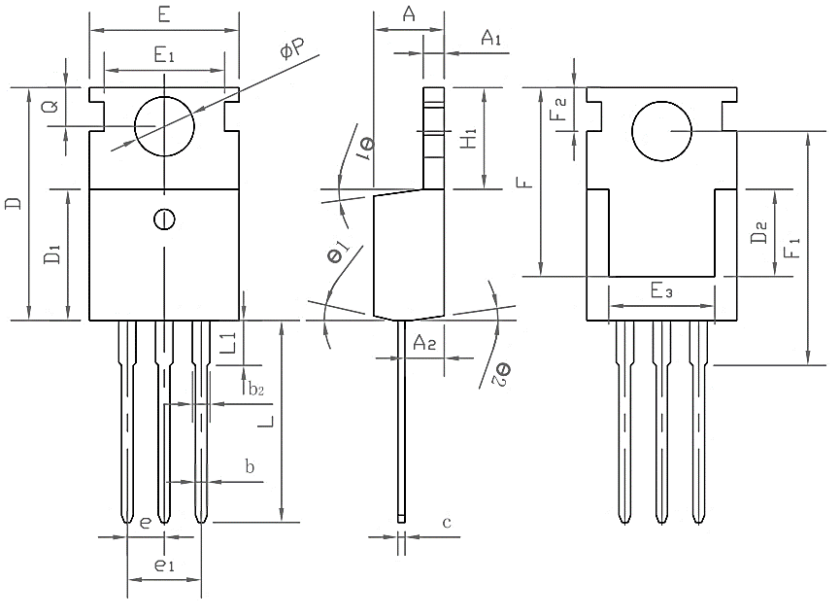


Figure 11 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data

TO-220



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
D	0.40	0.50	0.65
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.63	10.00	10.35
E3	7.00	8.00	8.40
e		0.37	
e1		0.10	
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
Φp	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°
F	13.30	13.50	13.70
F1	15.50	15.90	16.30
F2	2.80	3.00	3.20

Revision History

Revision	Release	Remark
V1.0	2023/11/28	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

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