
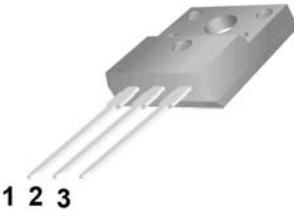
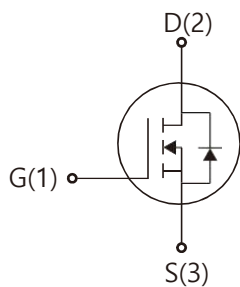


Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg=14nC (Typ.).
- $V_{DSS}=600\text{ V}, I_D=7\text{ A}$
- $R_{DS(on)} : 0.99\Omega$ (Max) @ $V_G=10\text{ V}$
- 100% Avalanche Tested

TO-220F 

1.Gate (G)
 2.Drain (D)
 3.Source (S)

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Sy mbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current	$T_j=25^\circ\text{C}$	7.0
		$T_j=100^\circ\text{C}$	4.7
V_{GSS}	Gate-Source Voltage	± 25	V
E_{AS}	Single Pulse Avalanche Energy (note1)	119	mJ
I_{AR}	Avalanche Current (note2)	7.0	A
P_D	Power Dissipation ($T_j=25^\circ\text{C}$)	45	W
T_j	Junction Temperature(Max)	150	°C
T_{stg}	Storage Temperature	-55~+150	°C
TL	Maximum lead temperature for soldering purpose,1/8' from case for 5 seconds	300	°C

Thermal Characteristics

Sy mbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance,Junction to Case	-	2.78	°C/W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	-	50	°C/W

Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0	600	-	-	V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA, Reference to 25°C	-	0.67	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =600V, V _{GS} =0V	-	-	10	μA
		V _{DS} =480V, T _J =125°C	-	-	100	
I _{GSSF}	Gate-body leakage Current, Forward	V _{GS} =+30V, V _{DS} =0V	-	-	100	nA
I _{GSSR}	Gate-body leakage Current, Reverse	V _{GS} =-30V, V _{DS} =0V	-	-	-100	
On Characteristics						
V _{GS(TH)}	Gate Threshold Voltage	I _D =250μA, V _{DS} =V _{GS}	2	-	4	V
R _{DS(ON)}	Static Drain-Source On-Resistance	I _D =3.5A, V _{GS} =10V	-	0.89	0.99	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =50V, V _{GS} =0V, f=1.0MHz	-	363	-	pF
C _{oss}	Output Capacitance		-	24.6	-	
C _{rss}	Reverse Transfer Capacitance		-	1.1	-	
Switching Characteristics						
T _{d(on)}	Turn-On Delay Time	V _{DD} =300V, I _D =2.5A, R _G =4.7Ω, V _{GS} =10V	-	7.2	-	nS
T _r	Turn-On Rise Time		-	10.3	-	
T _{d(off)}	Turn-Off Delay Time		-	26.4	-	
T _f	Turn-Off Rise Time		-	12.6	-	
Q _g	Total Gate Charge	V _{DS} =480V, V _{GS} =10V, I _D =7A (Note3,4)	-	14	-	nC
Q _{gs}	Gate-Source Charge		-	2.7	-	
Q _{gd}	Gate-Drain Charge		-	7.7	-	
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Max. Diode Forward Current	-	-	-	7	A
I _{SM}	Max. Pulsed Forward Current	-	-	-	28	
V _{SD}	Diode Forward Voltage	I _D =7A	-	-	1.3	V
T _{rr}	Reverse Recovery Time	I _S =7A, V _{GS} =0V, diF/dt=100A/μs	-	213	-	nS
Q _{rr}	Reverse Recovery Charge	(Note3)	-	1.8	-	μA

- Notes : 1, L=0.5mH, I_{AS}= 7A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
 2, Repetitive Rating : Pulse width limited by maximum junction temperature
 3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
 4, Essentially Independent of Operating Temperature

Typical Characteristics

Figure 1. Safe operating area

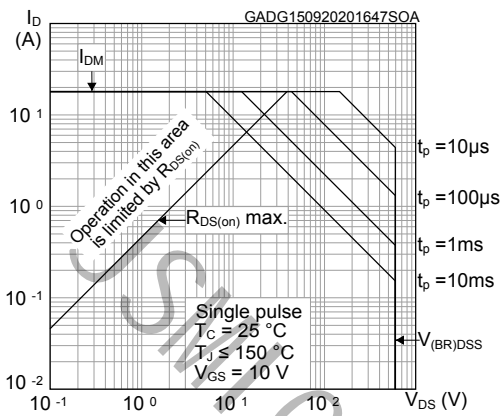


Figure 2. Thermal impedance

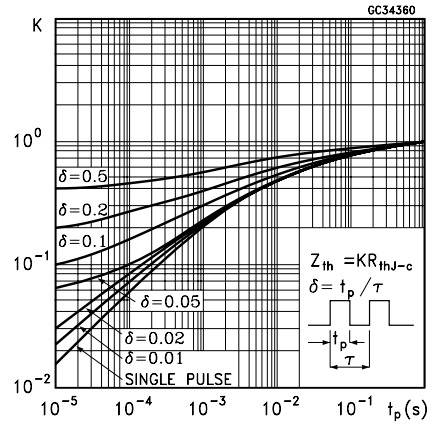


Figure 3. Output characteristics

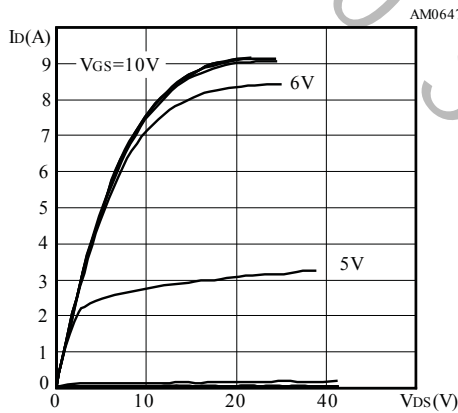


Figure 4. Transfer characteristics

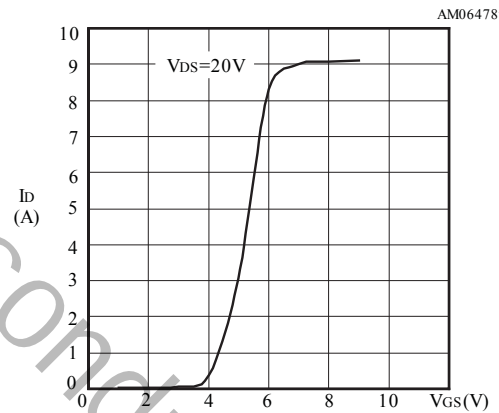


Figure 5. Gate charge vs gate-source voltage

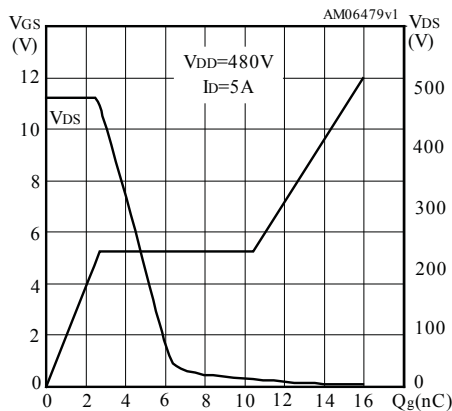
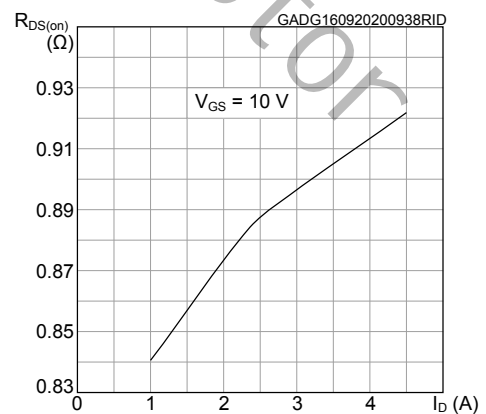


Figure 6. Static drain-source on-resistance



Typical Characteristics (Continued)

Figure 7. Capacitance variations

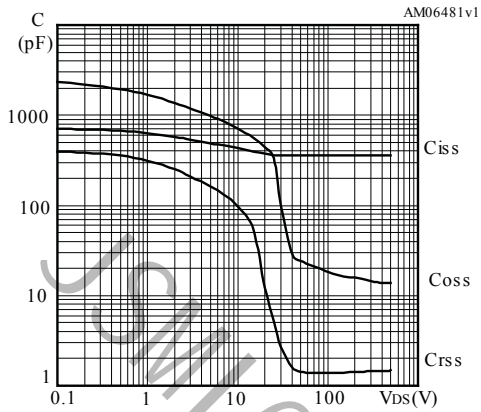


Figure 8. Output capacitance stored energy

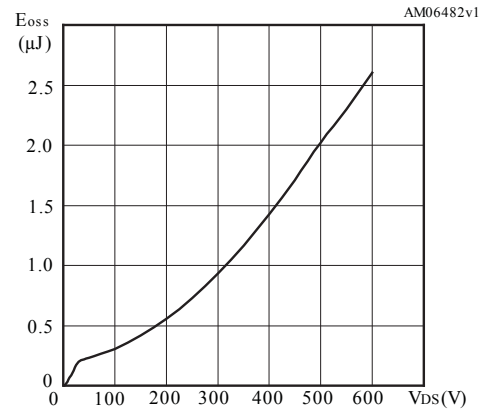


Figure 9. Normalized gate threshold voltage vs temperature

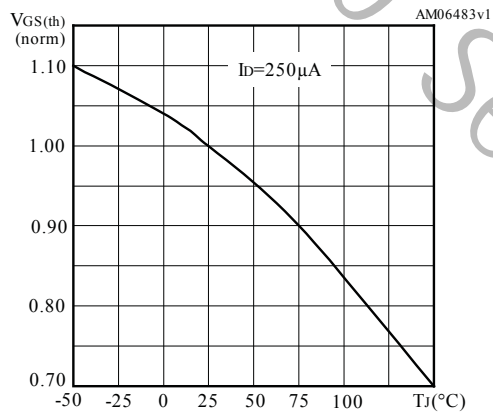


Figure 10. Normalized on-resistance vs temperature

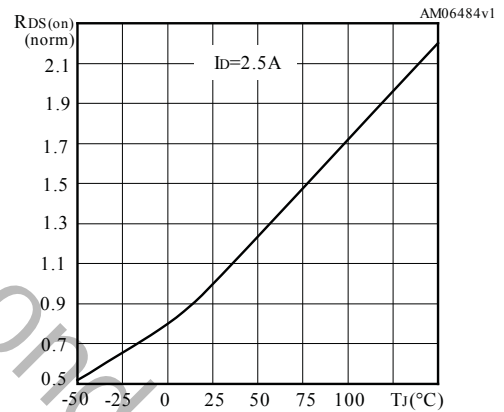


Figure 11. Normalized V_{(BR)DSS} vs temperature

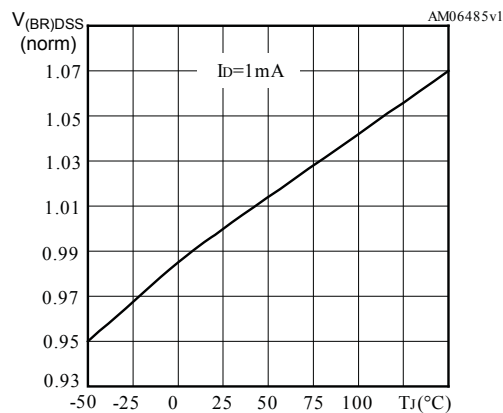
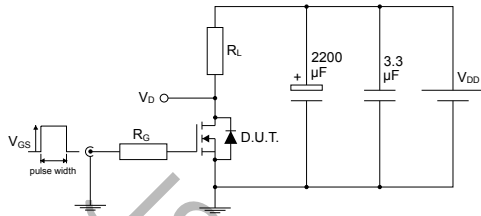
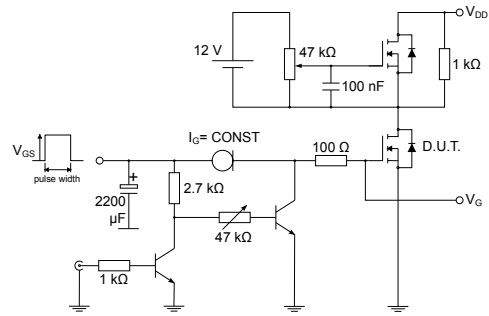


Figure 12. Test circuit for resistive load switching times



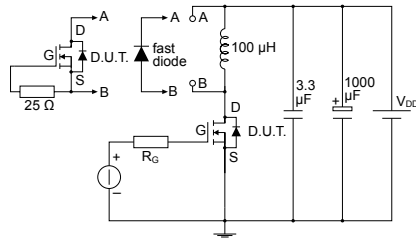
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Figure 13. Test circuit for gate charge behavior



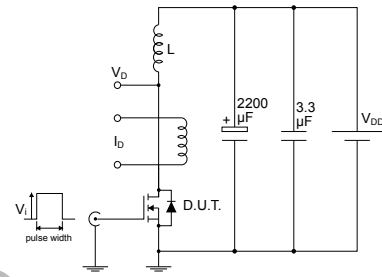
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Figure 14. Test circuit for inductive load switching and diode recovery times



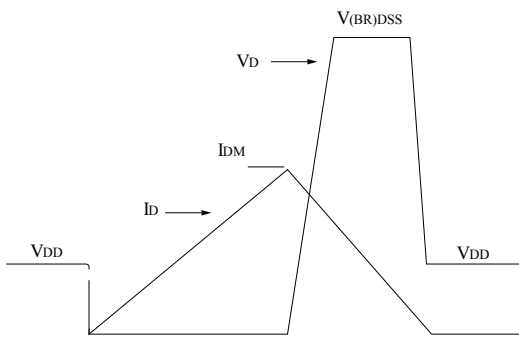
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Figure 15. Unclamped inductive load test circuit



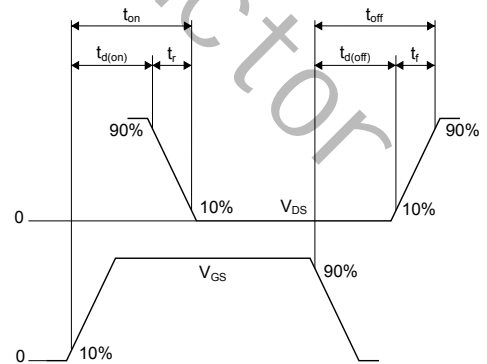
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Figure 16. Unclamped inductive waveform



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Figure 17. Switching time waveform



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Package Dimension

TO-220F

Unit: mm

