

APG040N10

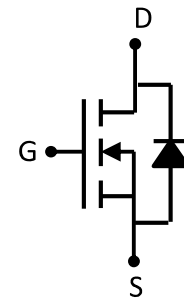
N-Channel Shielding-Gate Mosfet

AIIPOWER

DATA SHEET

Feature

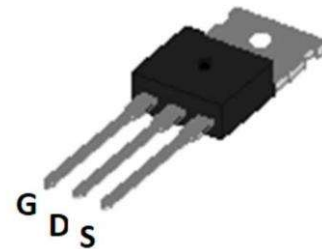
- 100V,120A
 $R_{DS(ON)} < 4.2m\Omega @ V_{GS}=10V$ TYP:3.7m Ω
- Low FOM $R_{DS(ON)} \times Q_G$
- Ultra-low on-resistance
- Halogen-free
- RoHS compliant



Schematic diagram

Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Motor Drivers



TO-220

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
G040N10	APG040N10	TO-220		-	1000

ABSOLUTE MAXIMUM RATINGS ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_C=25^\circ\text{C}$)	I_D	120	A
Continuous Drain Current ($T_C=100^\circ\text{C}$)	I_D	100	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	460	A
Single Pulsed Avalanche Energy ⁽²⁾	E_{AS}	317	mJ
Power Dissipation	P_D	178	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.7	$^\circ\text{C}/\text{W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	54	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25°C unless otherwise noted)

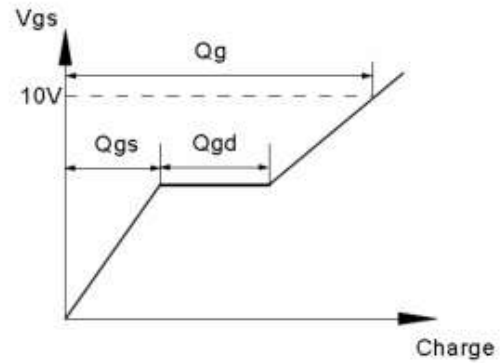
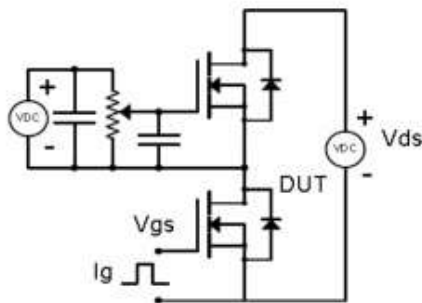
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =250μA	100	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =100V, V _{GS} = 0V	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage ⁽³⁾	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-source on-resistance ⁽³⁾	R _{DS(on)}	V _{GS} =10V, I _D =20A	-	3.7	4.2	mΩ
Gate Resistance	R _G	f=1MHZ	-	1.6	-	Ω
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, f =1MHz	-	4270	-	pF
Output Capacitance	C _{oss}		-	1280	-	
Reverse Transfer Capacitance	C _{rss}		-	63	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =50V, R _L =2.5Ω, V _{GS} =10V, R _G =6Ω	-	24	-	ns
Turn-on rise time	t _r		-	35	-	
Turn-off delay time	t _{d(off)}		-	53	-	
Turn-off fall time	t _f		-	31	-	
Total Gate Charge	Q _g	V _{DS} =50V, I _D =20A, V _{GS} =10V	-	66	-	nC
Gate-Source Charge	Q _{gs}		-	17	-	
Gate-Drain Charge	Q _{gd}		-	16	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V _{SD}	V _{GS} =0V, I _S =1A	-	0.7	1.2	V
Maximum Continuous Diode Forward current ⁽⁴⁾	I _S		-	-	120	A
Maximum Pulsed Diode Forward current ⁽⁴⁾	I _{SM}		-	-	460	A
Reverse recovery time	T _{rr}	I _S =20A, V _{GS} =0V, dI _F /dt=100A/us	-	67	-	ns
Reverse recovery charge	Q _{rr}	I _S =20A, V _{GS} =0V, dI _F /dt=100A/us	-	117	-	nC
Peak Reverse recovery Current	I _{RRM}	I _S =20A, V _{GS} =0V, dI _F /dt=100A/us	-	3.1	-	A

Notes:

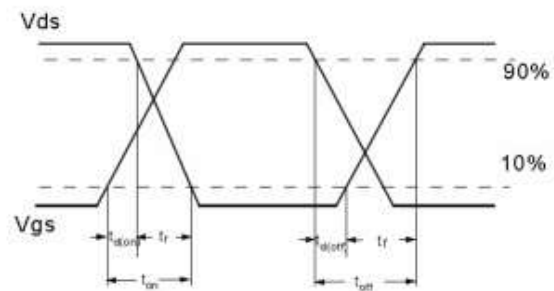
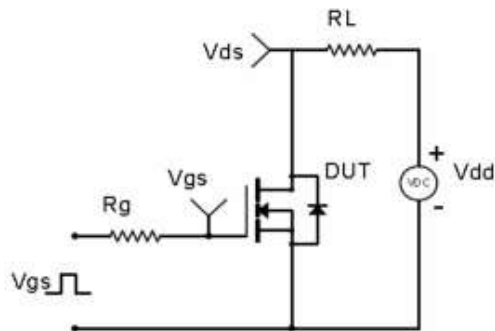
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T_J=25°C, V_{DD}=50V, R_G=25 Ω, L=0.5mH
3. Pulse Test: pulse width ≤300μs, duty cycle ≤2%
4. Surface Mounted on FR4 Board, t ≤10 sec

Test Circuit & Waveform

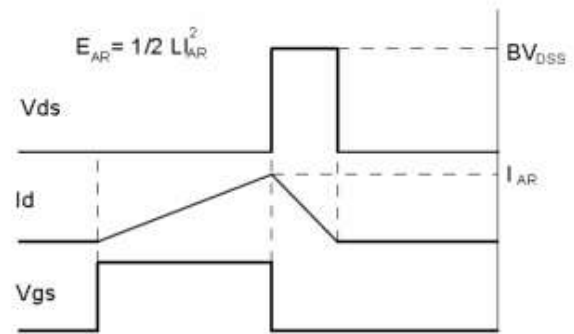
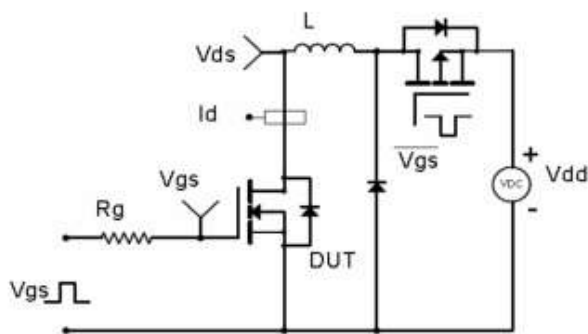
Gate Charge Test Circuit & Waveform



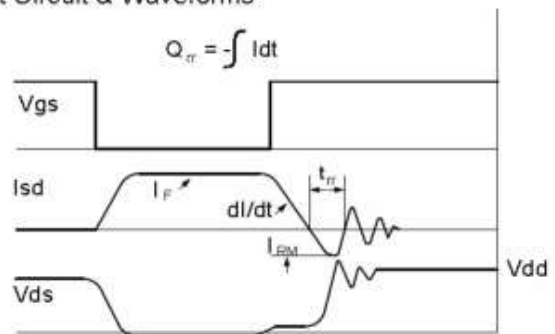
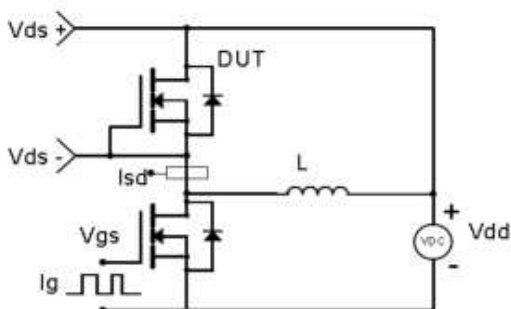
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Electrical Characteristics Diagrams

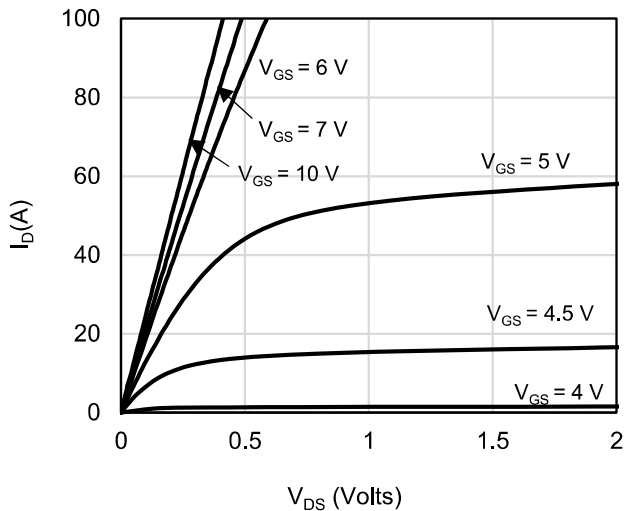


Figure 1: On-Region Characteristics

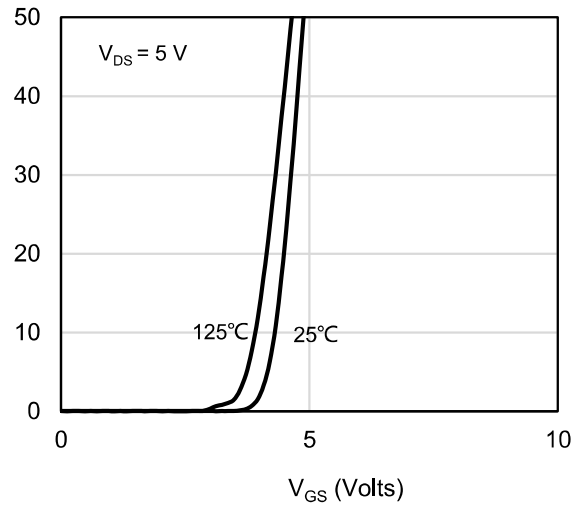


Figure 2: Transfer Characteristics

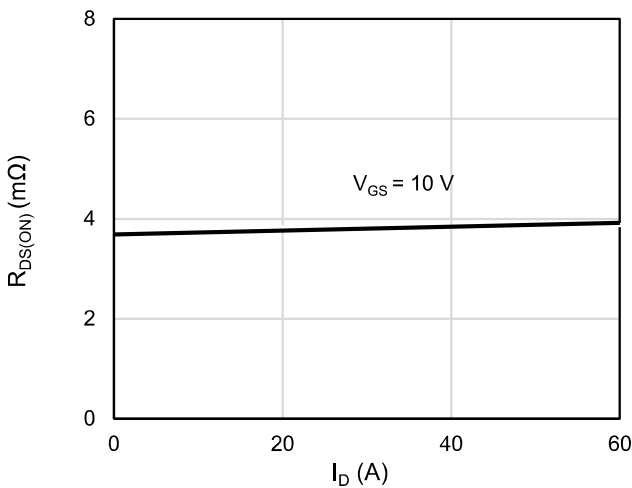


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

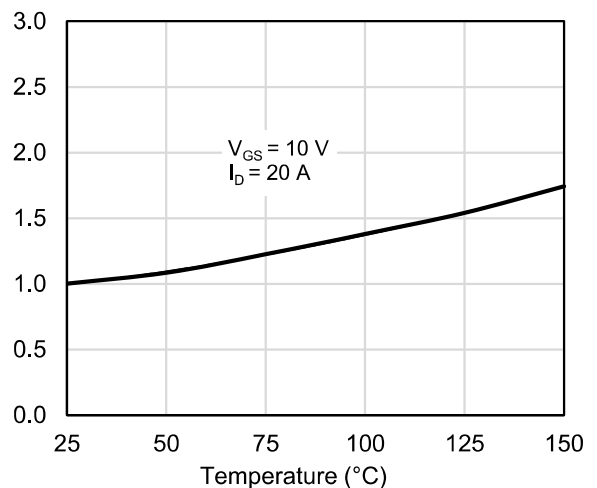


Figure 4: On-Resistance vs. Junction Temperature

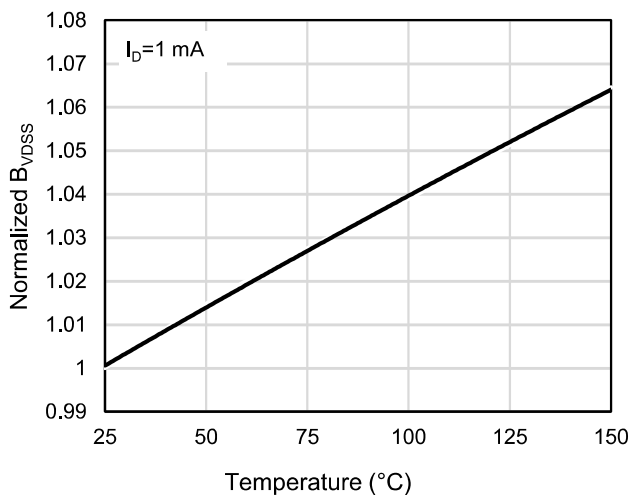


Figure 5: Breakdown Voltage vs. Junction Temperature

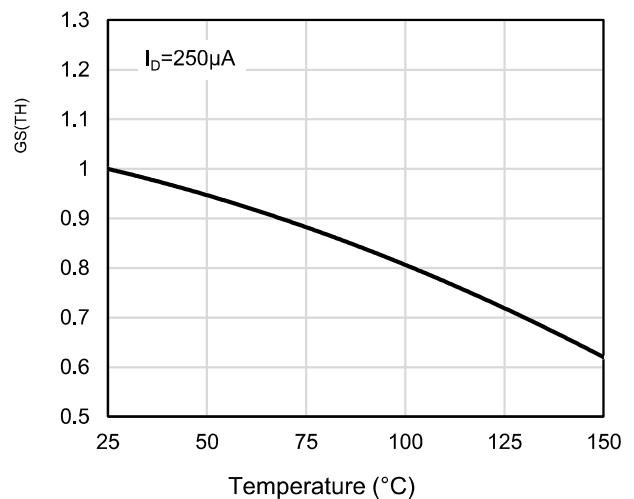


Figure 6: Threshold Voltage vs. Junction Temperature

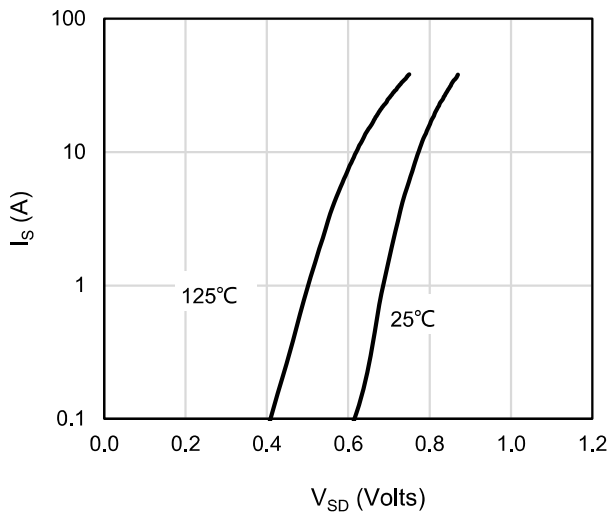


Figure 7: Body-Diode Characteristics

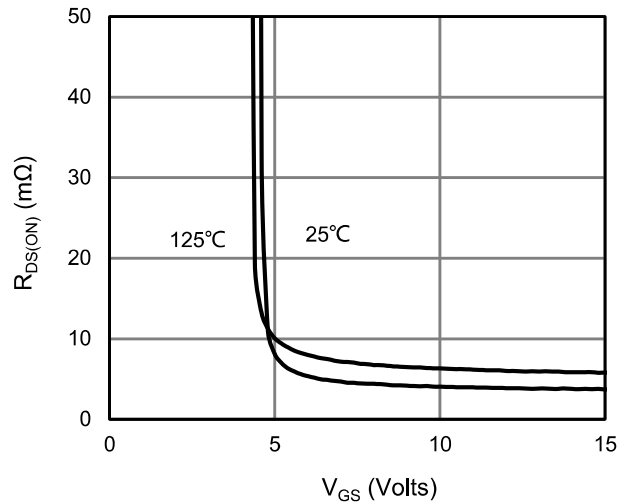


Figure 8: On-Resistance vs. Gate-Source Voltage

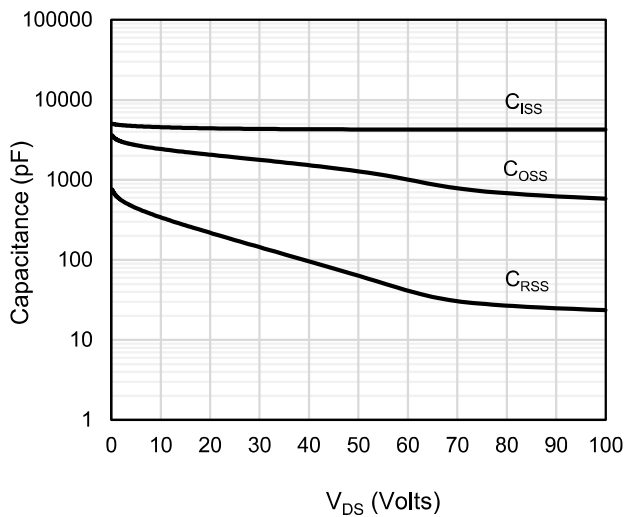


Figure 9: Capacitance Characteristics

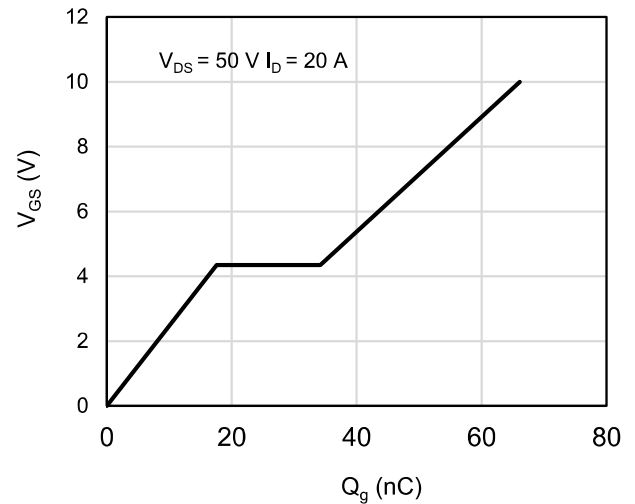


Figure 10: Gate-Charge Characteristics

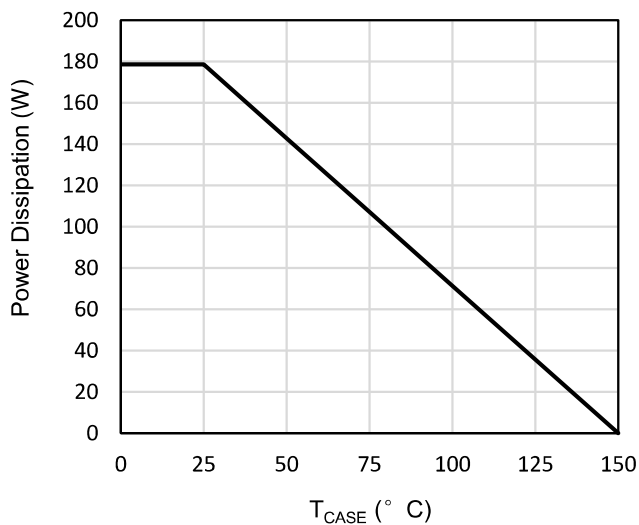


Figure 11: Power De-rating

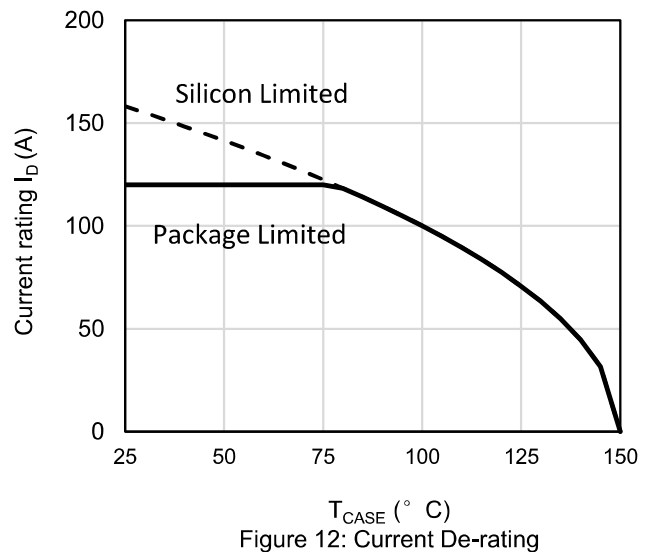


Figure 12: Current De-rating

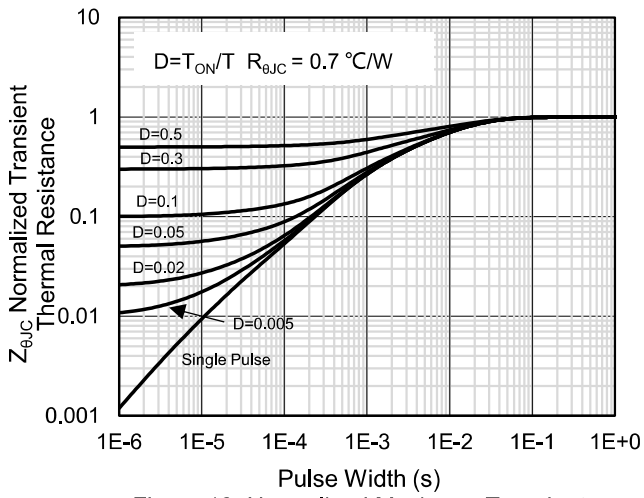


Figure 13: Normalized Maximum Transient Thermal Impedance

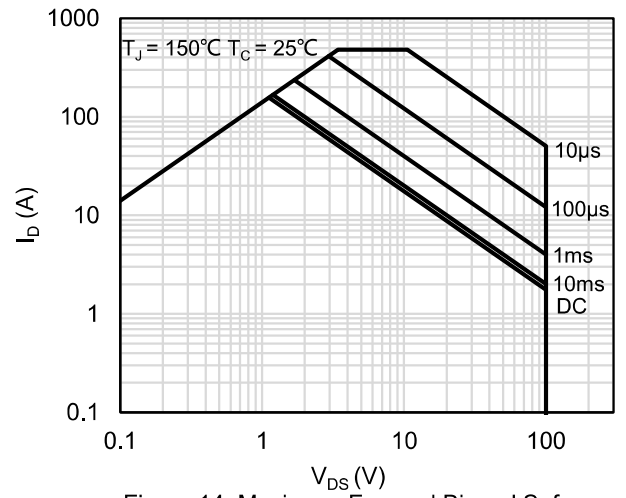
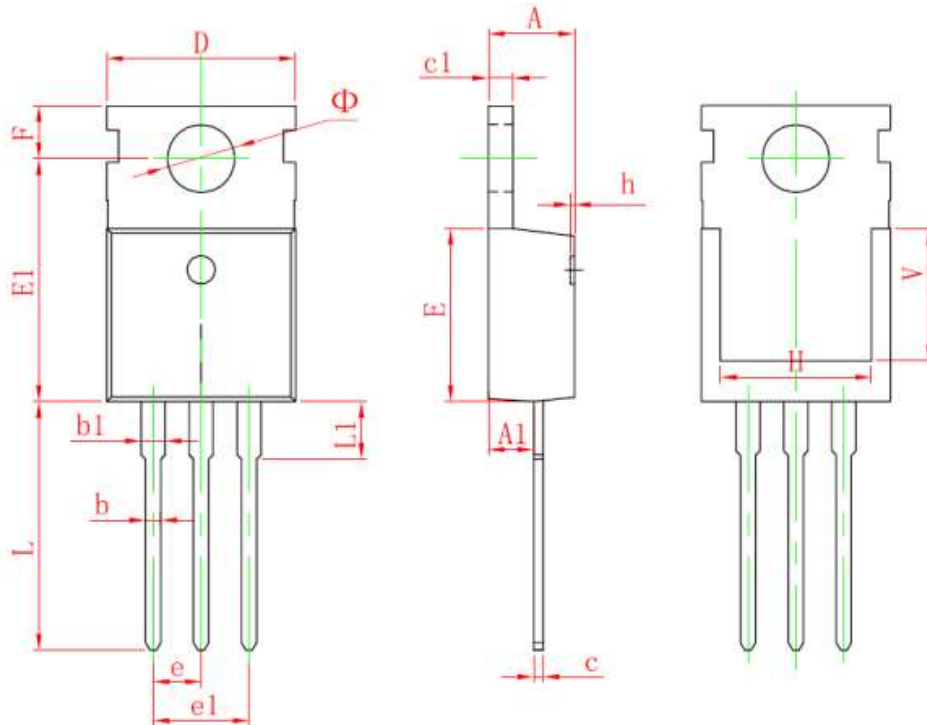


Figure 14: Maximum Forward Biased Safe Operating Area

APG040N10

N-Channel Shielding-Gate Mosfet

TO220 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	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	13.050	0.498	0.514
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