

# APG054N10

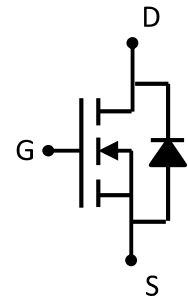
## N-Channel Shielding-Gate Mosfet

# AIPOWER

## DATA SHEET

### Feature

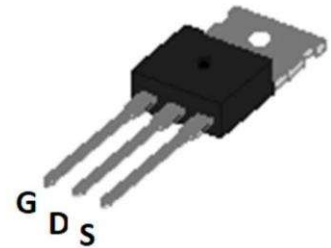
- 100V,120A  
 $R_{DS(ON)} < 5.4m\Omega @ V_{GS}=10V$
- Split Gate Trench Technology
- Provide Excellent  $R_{DS(ON)}$  And Low Gate Charge



Schematic diagram

### Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Rectifier



TO-220

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
G054N10	APG054N10	TO-220		-	1000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a = 25^{\circ}C$ )	$I_D$	120	A
Continuous Drain Current ( $T_a = 100^{\circ}C$ )	$I_D$	84	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	440	A
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	225	mJ
Power Dissipation	$P_D$	192	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.65	$^{\circ}C/W$
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55~ +150	$^{\circ}C$

**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

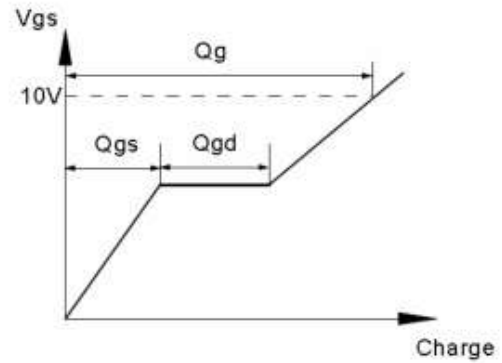
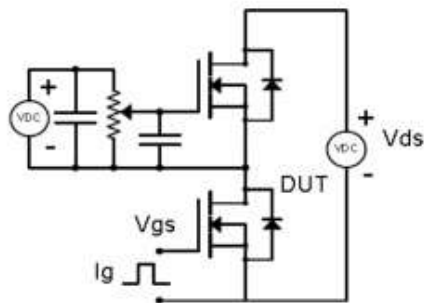
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	100	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage <sup>(3)</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	3	4	V
Drain-source on-resistance <sup>(3)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	4.5	5.4	mΩ
Gate Resistance	R <sub>G</sub>	f =1MHz	-	3.5	-	Ω
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f =1MHz	-	3244	-	pF
Output Capacitance	C <sub>oss</sub>		-	1075	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	52	-	
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V, RL=2.5Ω V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω	-	22	-	ns
Turn-on rise time	t <sub>r</sub>		-	36	-	
Turn-off delay time	t <sub>d(off)</sub>		-	49	-	
Turn-off fall time	t <sub>f</sub>		-	31	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	51	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	15	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	13	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	I <sub>S</sub>		-	-	120	A
Reverse recovery time	T <sub>rr</sub>	I <sub>S</sub> =15A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us		58		ns
Reverse recovery charge	Q <sub>rr</sub>	I <sub>S</sub> =15A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us		90		nC

**Notes:**

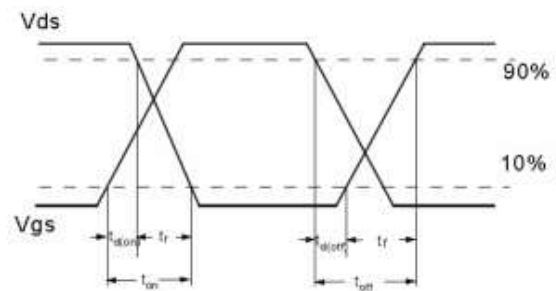
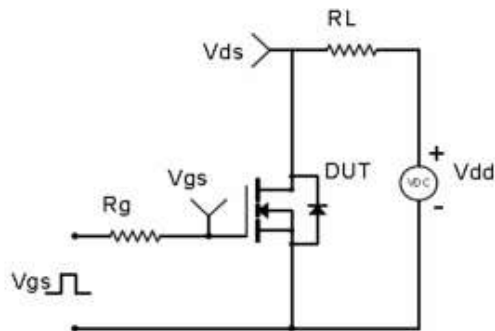
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, R<sub>G</sub>=25 Ω, L=0.5mH
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

**Test Circuit & Waveform**

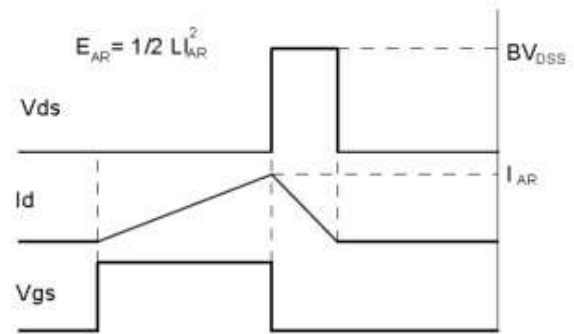
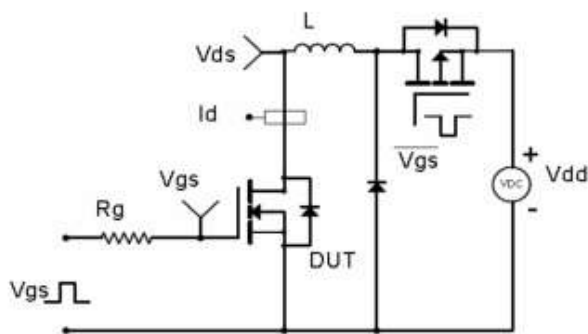
Gate Charge Test Circuit & Waveform



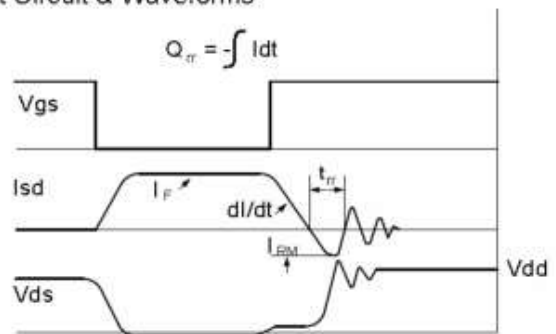
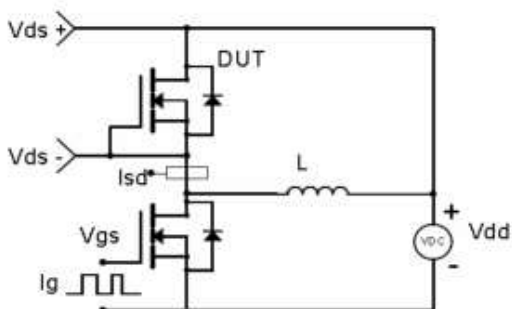
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Electrical Characteristics Diagrams**

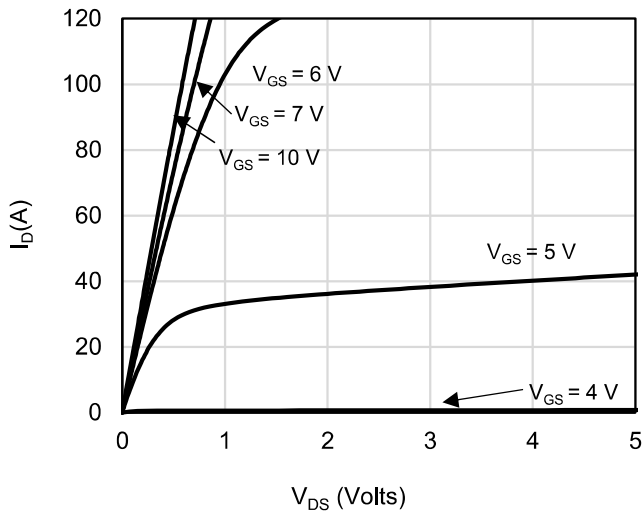


Figure 1: On-Region Characteristics

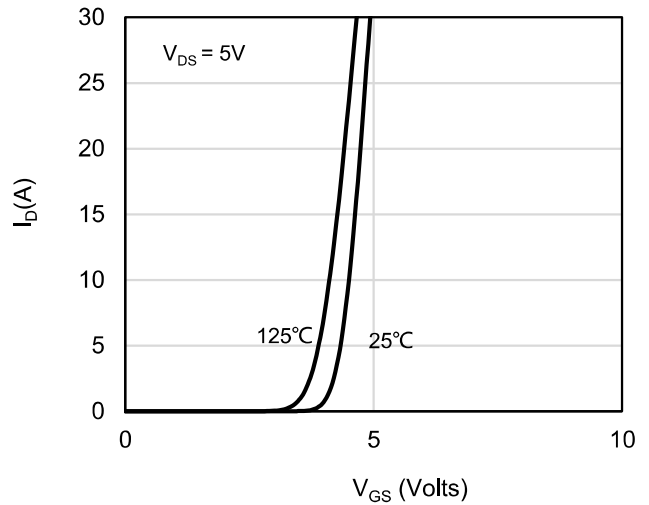


Figure 2: Transfer Characteristics

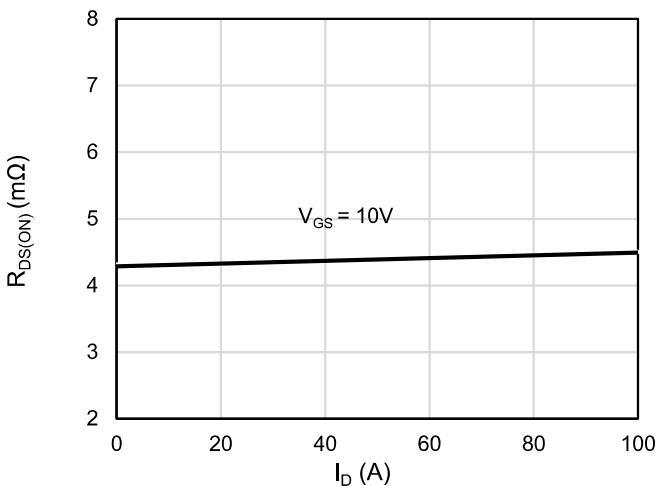


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

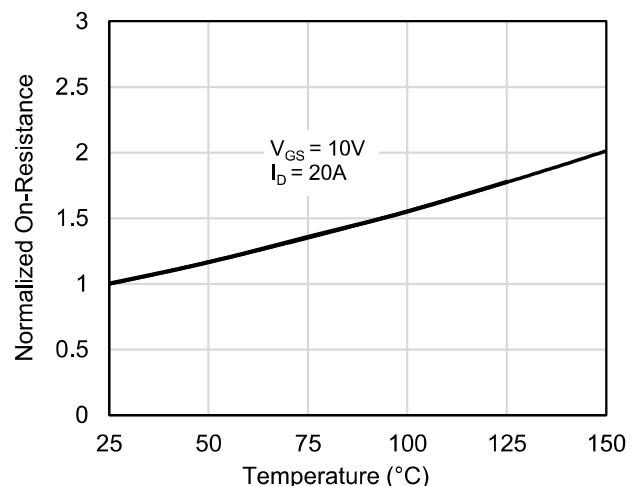


Figure 4: On-Resistance vs. Junction Temperature

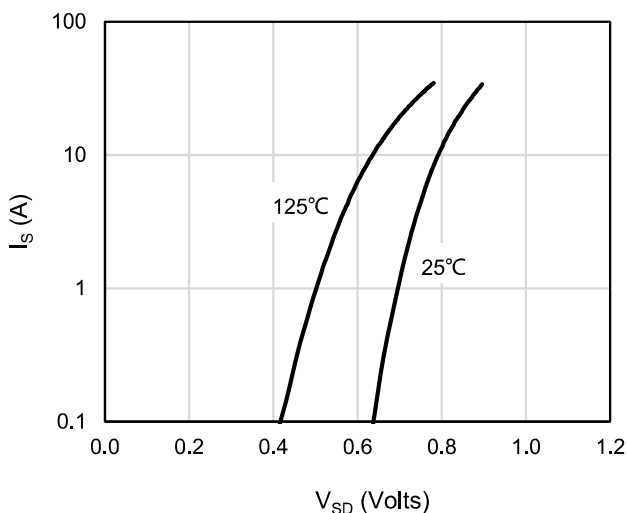


Figure 7: Body-Diode Characteristics

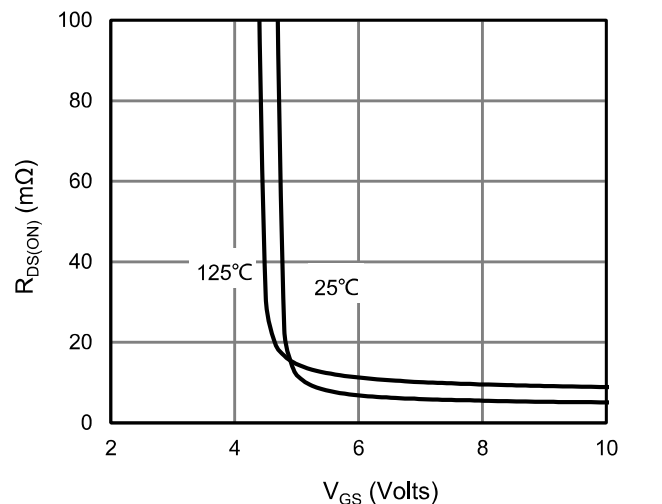


Figure 8: On-Resistance vs. Gate-Source Voltage

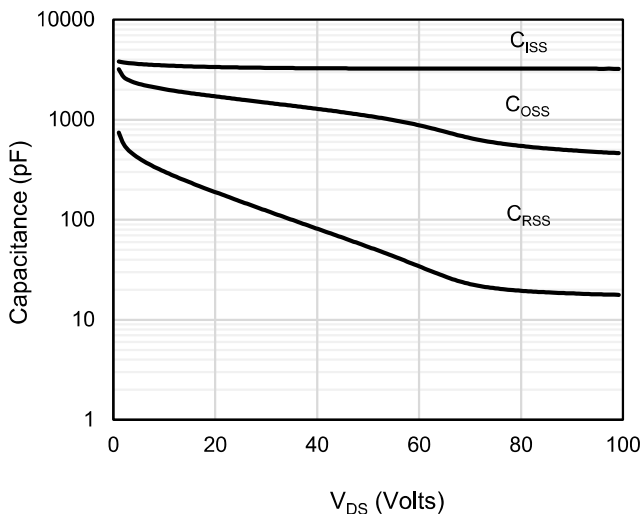


Figure 9: Capacitance Characteristics

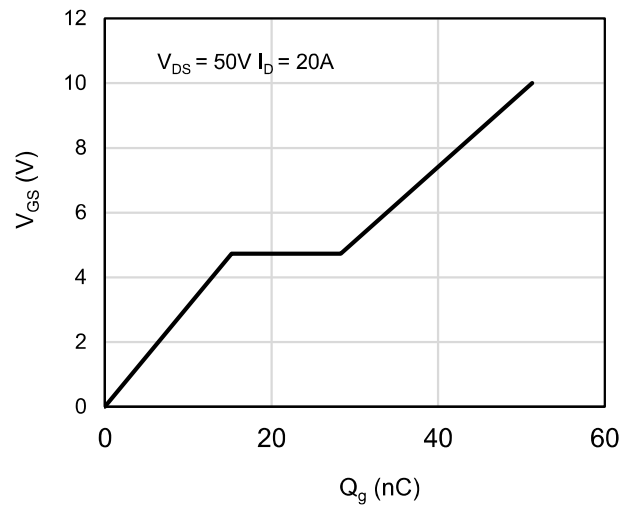


Figure 10: Gate-Charge Characteristics

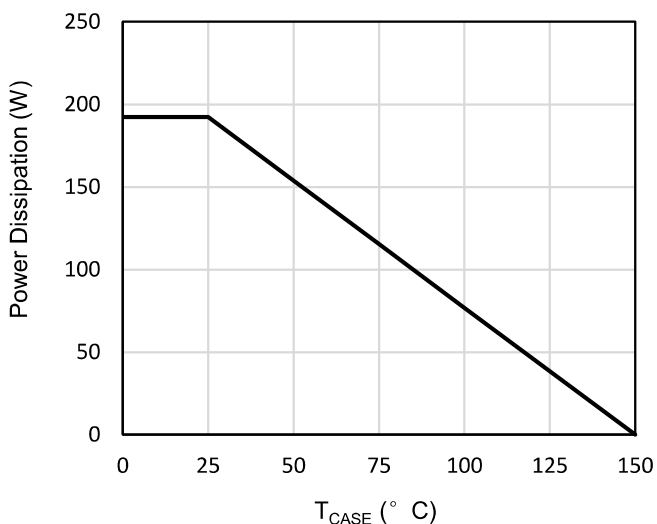


Figure 11: Power De-rating

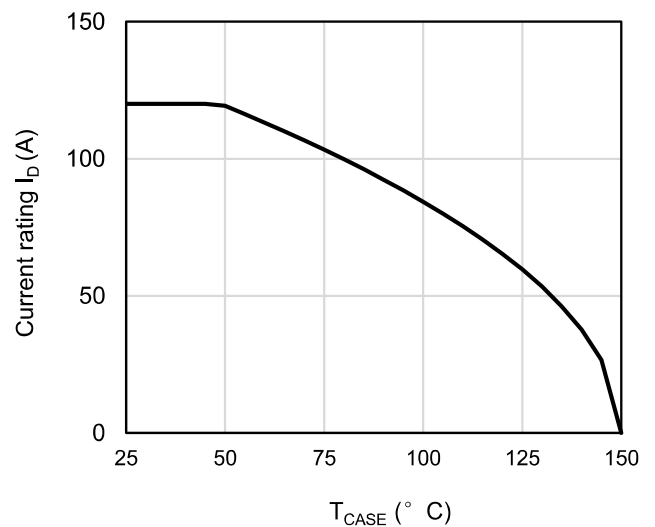


Figure 12: Current De-rating

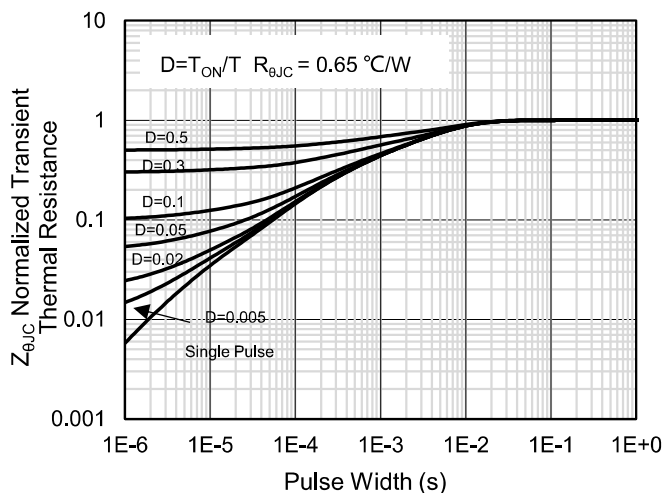


Figure 13: Normalized Maximum Transient Thermal Impedance

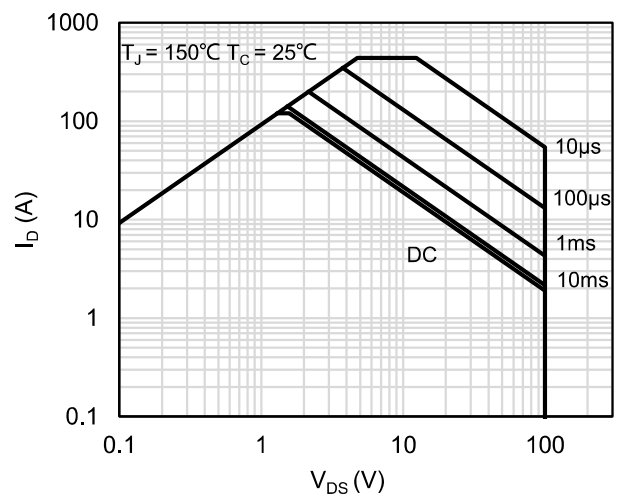
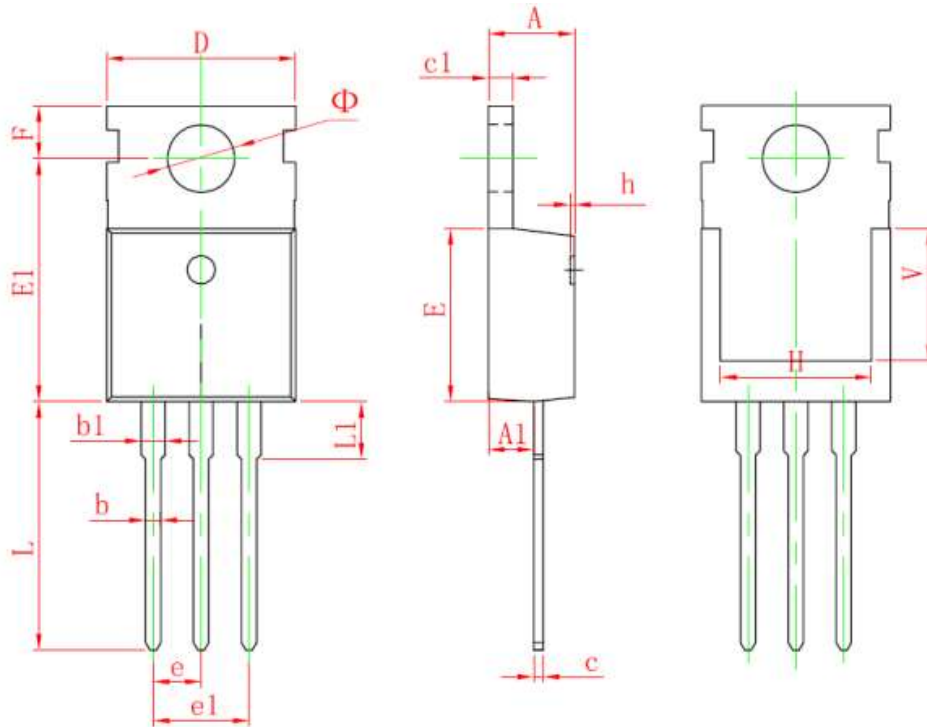


Figure 14: Maximum Forward Biased Safe Operating Area

# APG054N10

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