

# AP20N70F

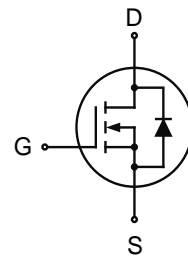
## N-Channel Enhancement Mosfet

# AIPOWER

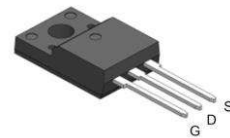
## DATA SHEET

### Feature

- 700V,20 A  
RDS(ON)  $\leq 0.55 \Omega$  @ VGS=10V, TYP=0.46  $\Omega$
- Fast Switching
- Low ON Resistance(Rdson $\leq 0.55\Omega$ )
- Low Gate Charge (Typical Data:61nC)
- 100% Single Pulse avalanche energy Test
- Halogen Free



Schematic Diagram



TO-220F

### Application

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
20N70F	AP20N70F	TO-220F	-	-	1000

### ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	700	V
Gate-Source Voltage	V <sub>GS</sub>	±30	V
Continuous Drain Current (T <sub>C</sub> =25°C)	I <sub>D</sub>	20	A
Continuous Drain Current (T <sub>C</sub> =100°C)	I <sub>D</sub>	12.6	A
Pulsed Drain Current <sup>(1)</sup>	I <sub>DM</sub>	80	A
Power Dissipation	P <sub>D</sub>	250	W
Single Pulse Avalanche Energy <sup>(2)</sup>	E <sub>AS</sub>	600	mJ
Junction to case <sup>(4)</sup>	R <sub>θJC</sub>	0.5	°C/W
Junction to Ambient <sup>(4)</sup>	R <sub>θJA</sub>	62.5	°C/W
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-55~ +150	°C

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

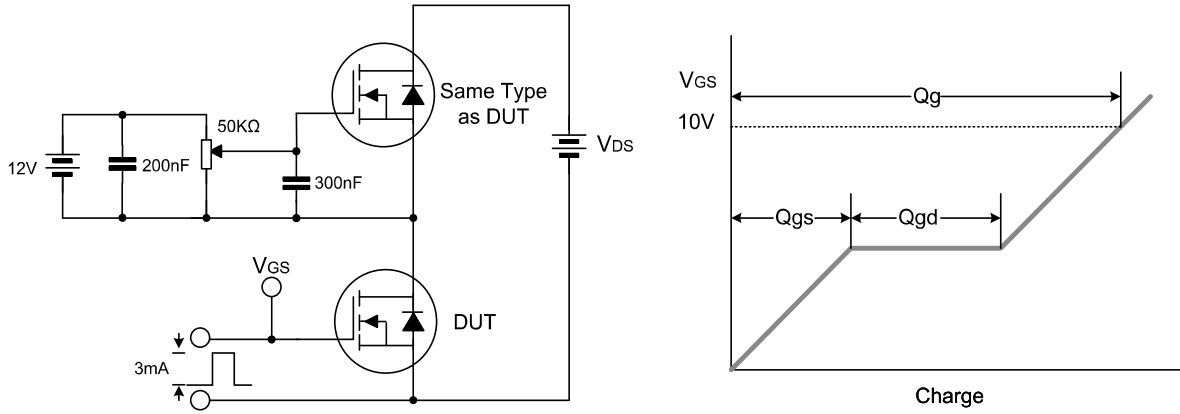
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	700	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =700V, V <sub>GS</sub> = 0V, T <sub>J</sub> =25°C	-	-	1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	0.46	0.55	Ω
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f =1MHz	-	3290	-	pF
Output Capacitance	C <sub>oss</sub>		-	240	-	
Reverse Transfer Capacitance	C <sub>rSS</sub>		-	5	-	
Forward Transconductance	G <sub>fs</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =10A		18		S
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =350V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω	-	34	-	ns
Turn-on rise time	t <sub>r</sub>		-	44	-	
Turn-off delay time	t <sub>d(off)</sub>		-	75	-	
Turn-off fall time	t <sub>f</sub>		-	53	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =560V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	61	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	15	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	18.5	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A	-	-	1.5	V
Diode Forward current	I <sub>S</sub>		-	-	20	A
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A,		700		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs		8.3		uC

**Notes:**

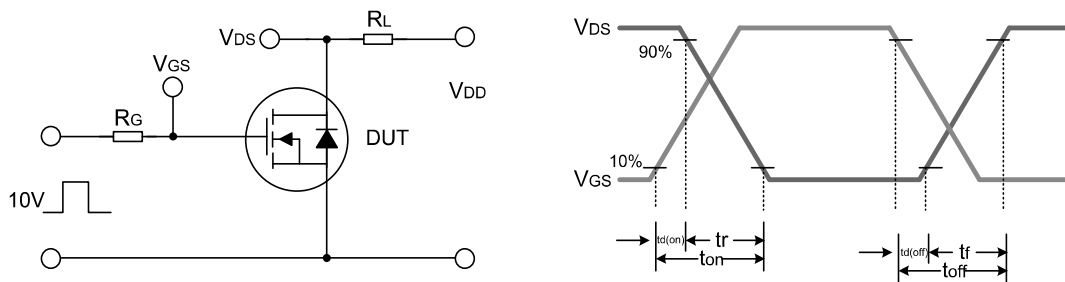
1. Repetitive Rating:pulse width limited by maximum junction temperature.
2. L=10mH,R<sub>G</sub>=25Ω,I<sub>AS</sub>=11A , starting T<sub>J</sub>=25°C .
3. I<sub>SD</sub>=20A,dI/dt≤100A/us,V<sub>DD</sub>≤B<sub>V</sub>DSS,starting T<sub>J</sub>=25°C .
4. Repetitive rating; pulse width limited by maximum junction tempera

**Test Circuit**

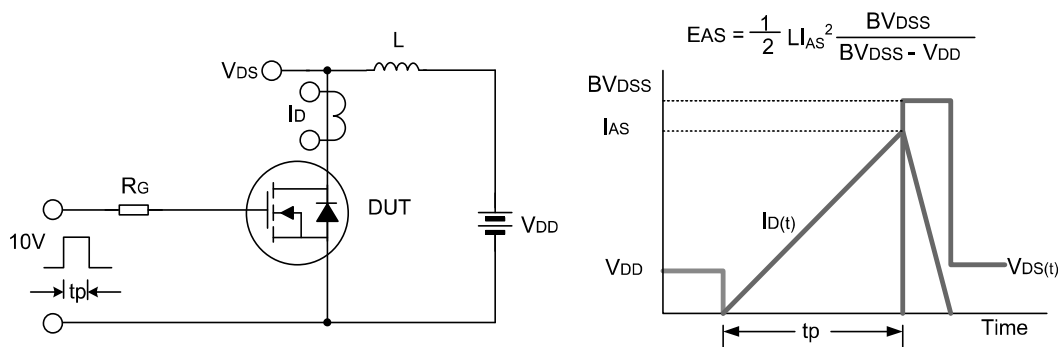
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



**Typical Performance Characteristics**

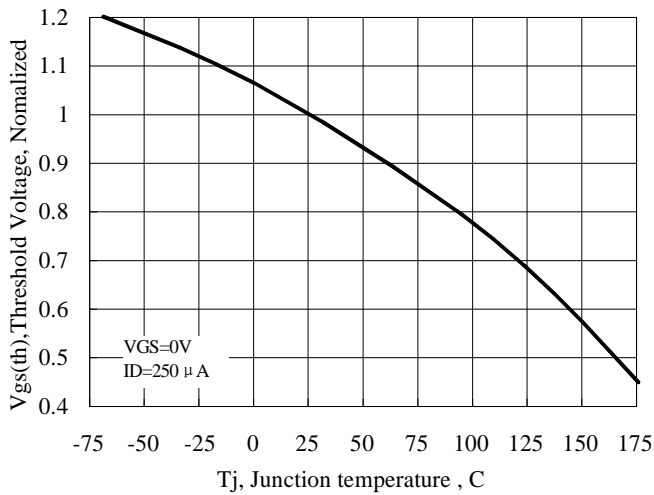


Figure 1 Typical Theshold Voltage vs Junction Temperature

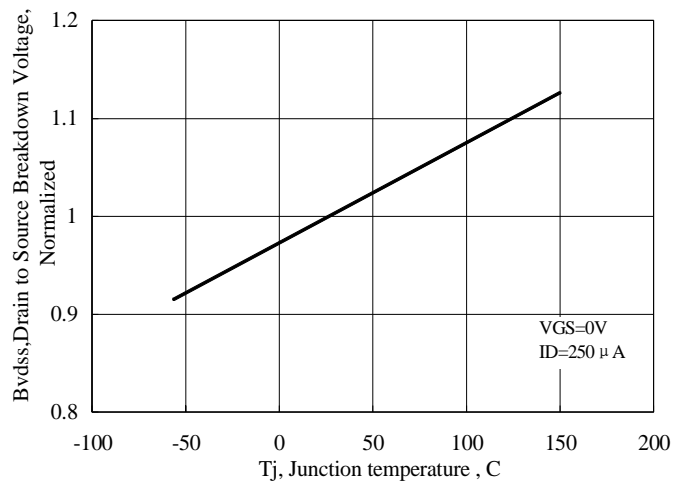


Figure 2 Typical Breakdown Voltage vs Junction Temperature

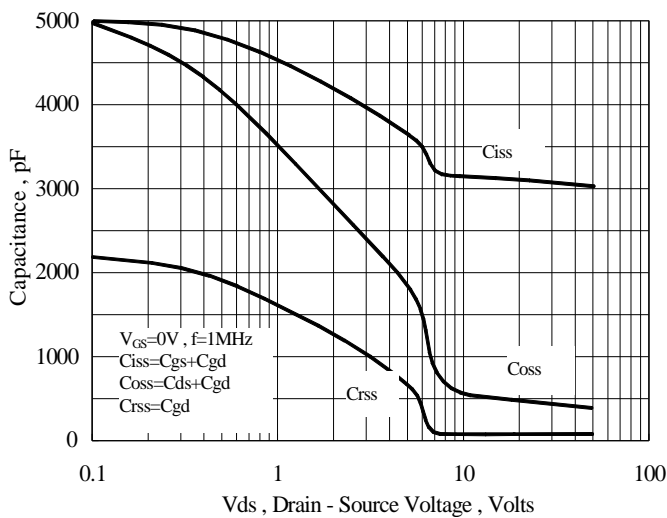


Figure 3 Typical Capacitance vs Drain to Source Voltage

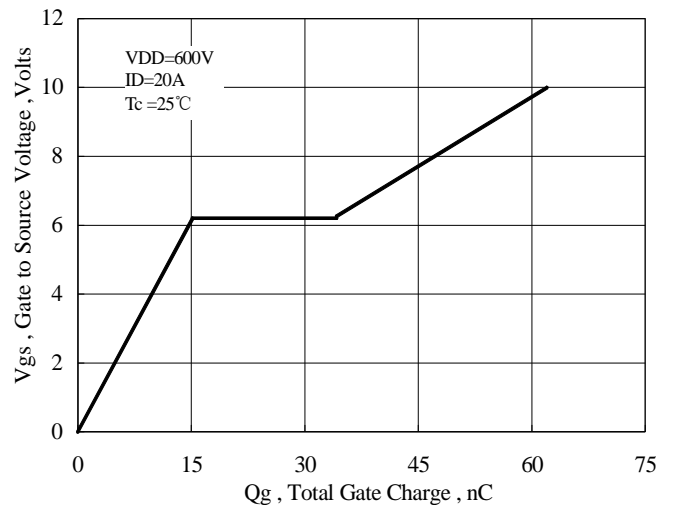


Figure 4 Typical Gate Charge vs Gate to Source Voltage

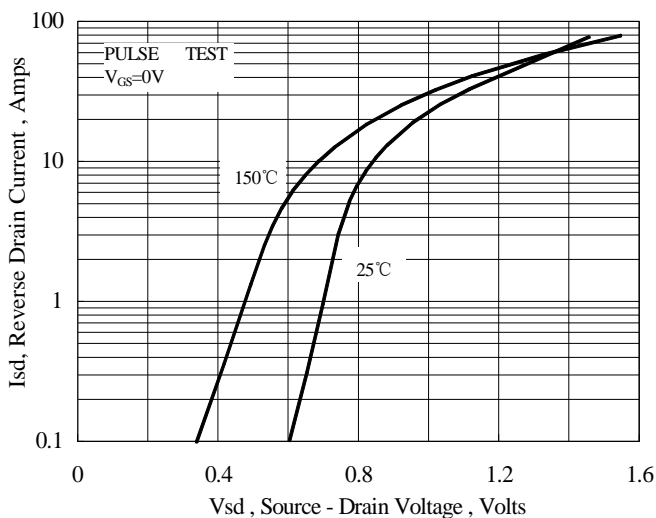


Figure 5 Typical Body Diode Transfer Characteristics

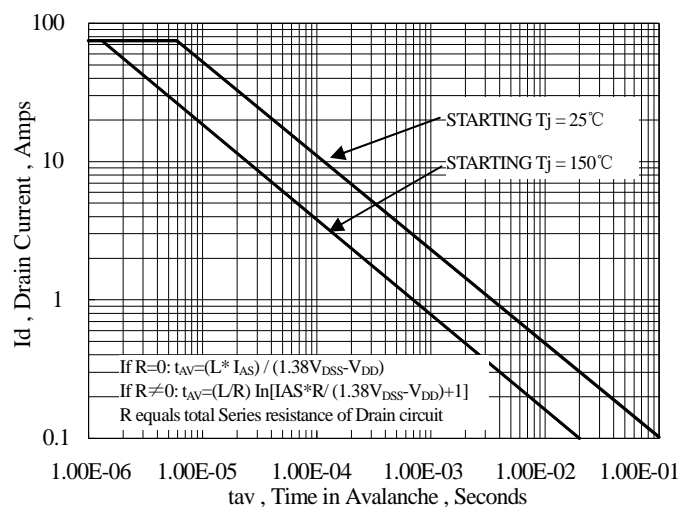


Figure 6 Unclamped Inductive Switching Capability

**Typical Performance Characteristics**

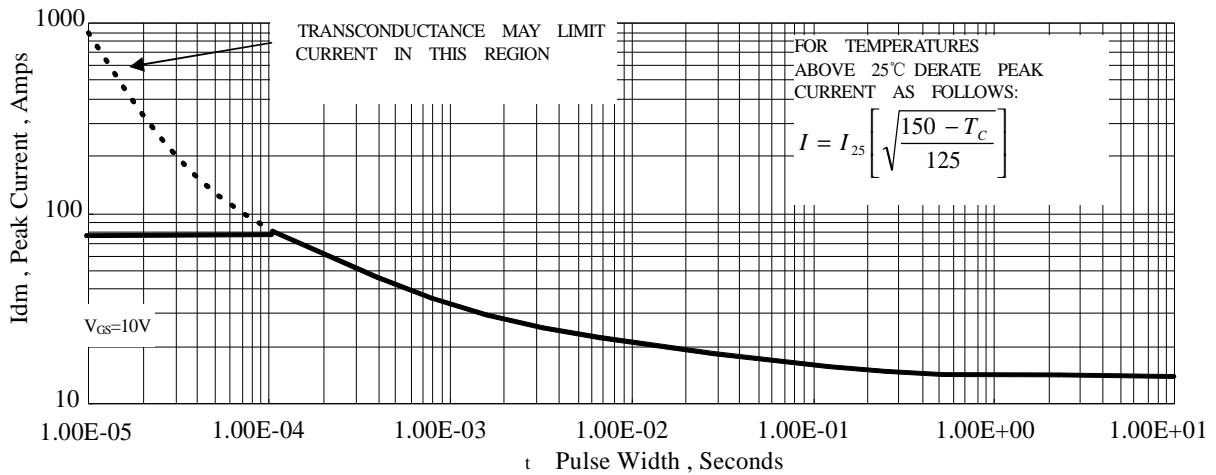


Figure 7 Maximum Peak Current Capability

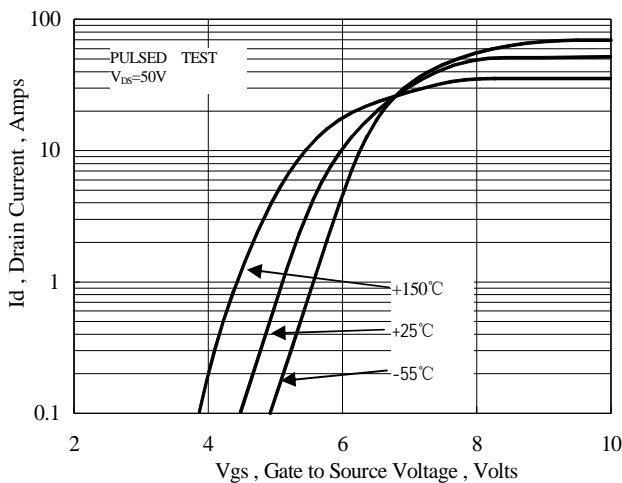


Figure 8 Typical Transfer Characteristics

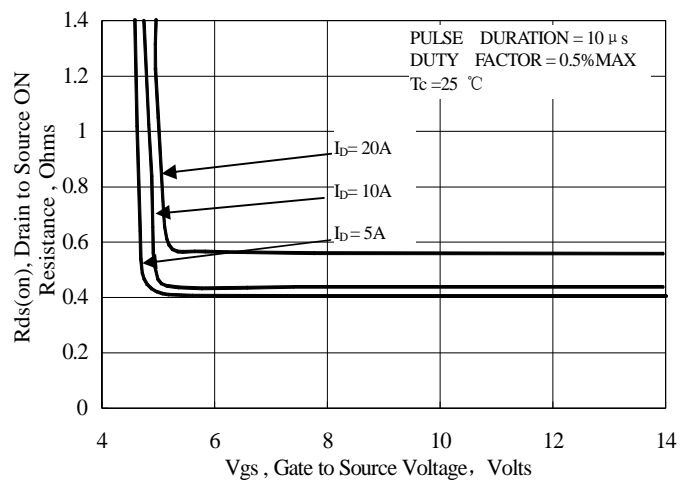


Figure 9 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

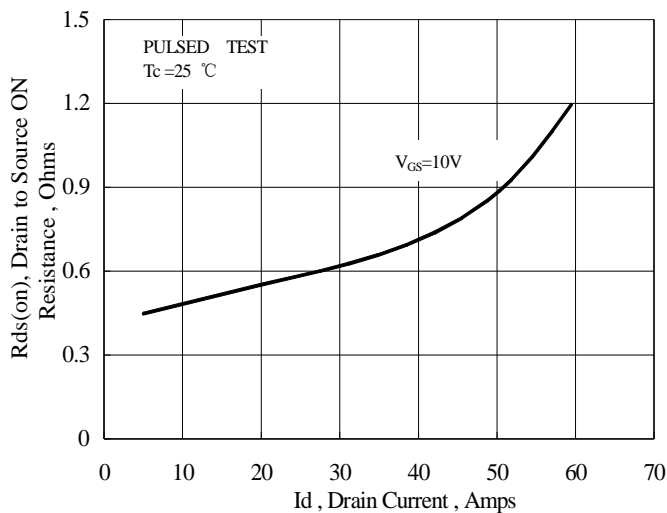


Figure 10 Typical Drain to Source ON Resistance vs Drain Current

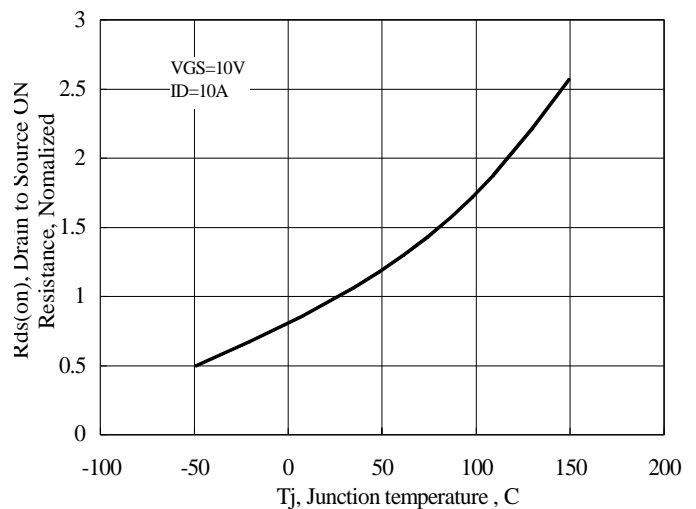


Figure 11 Typical Drain to Source on Resistance vs Junction Temperature

**Typical Performance Characteristics**

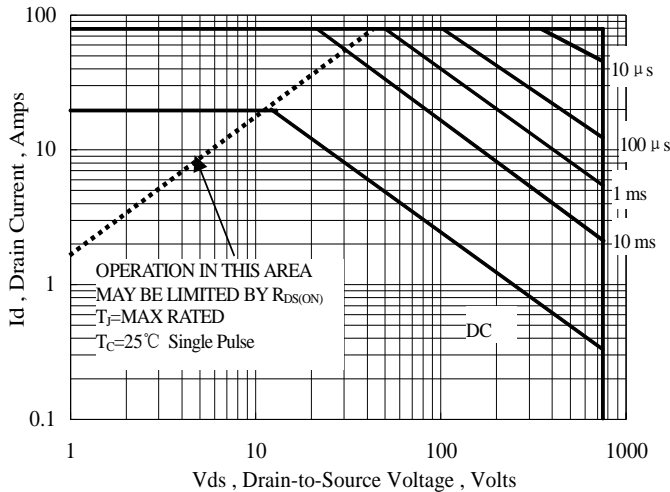


Figure 12 Maximum Forward Bias Safe Operating Area

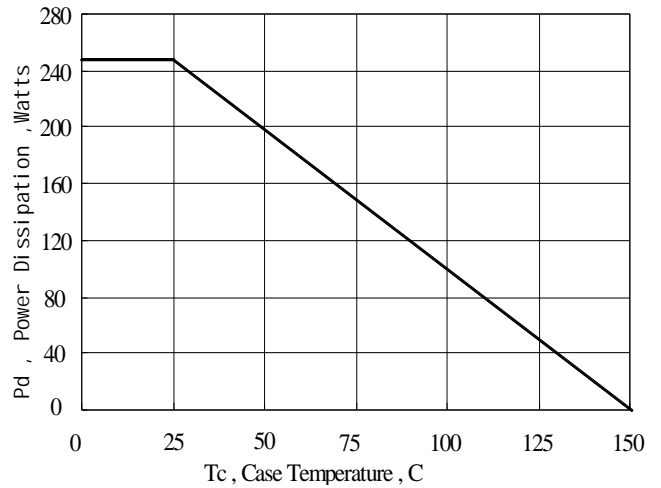


Figure 13 Maximum Power Dissipation vs Case Temperature

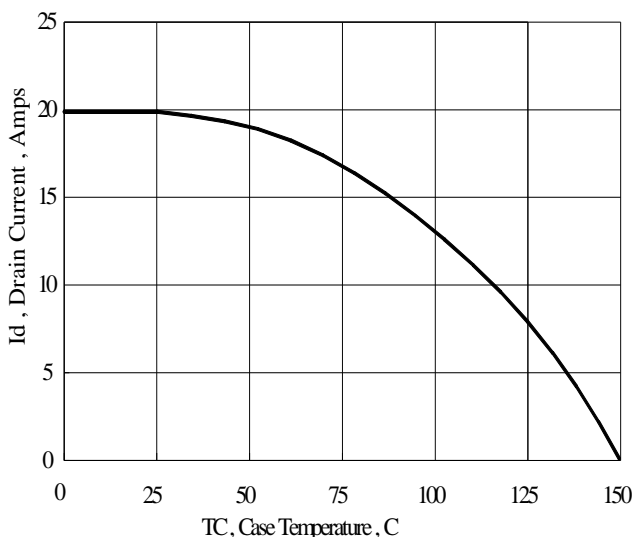


Figure 14 Maximum Continuous Drain Current vs Case Temperature

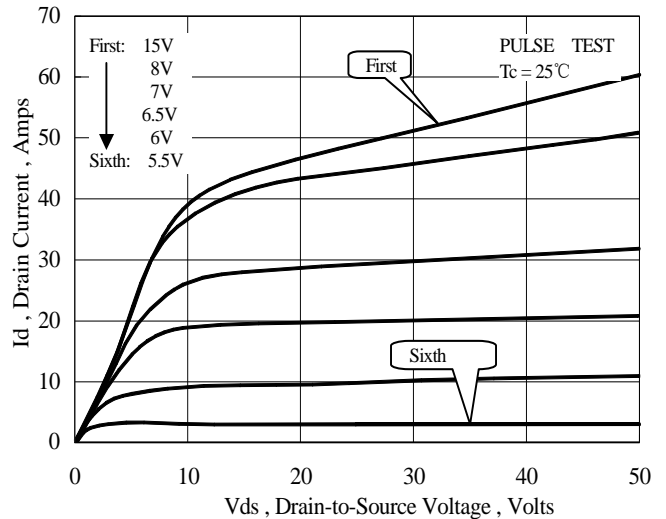


Figure 15 Typical Output Characteristics

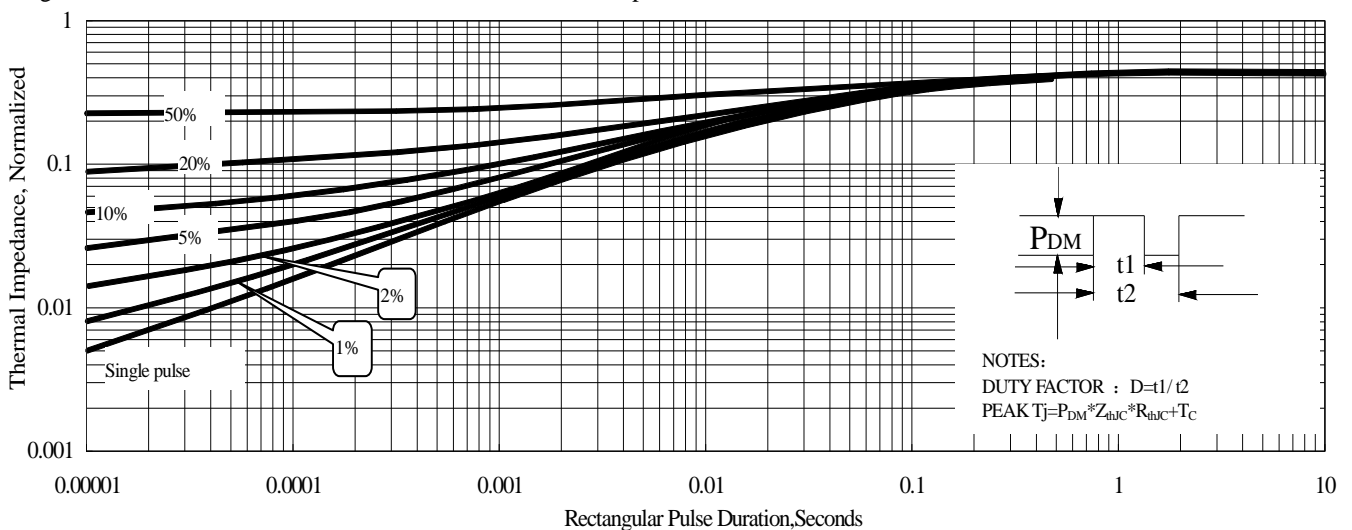
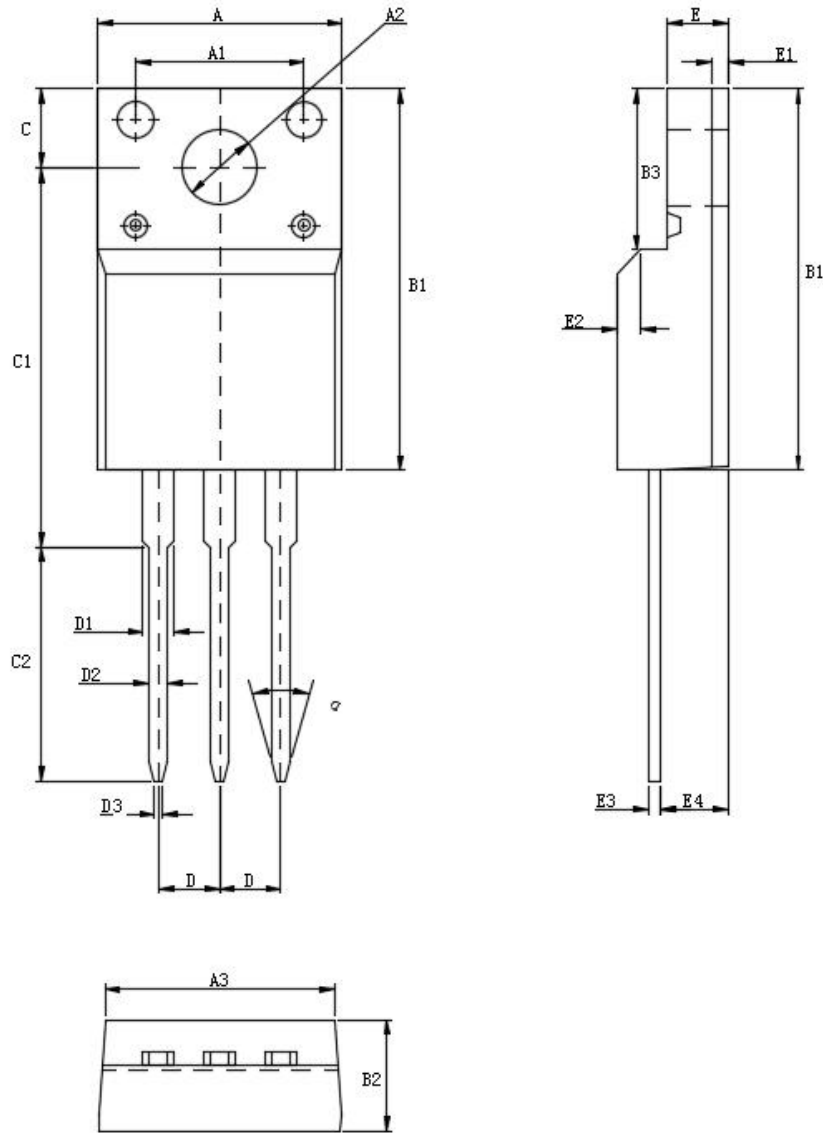


Figure 16 Maximum Effective Thermal Impedance, Junction to Case

**Package Dimensions of TO-220F**



UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.80		10.60	D		2.54	
A1		7.00		D1	1.15		1.55
A2	2.90		3.40	D2	0.60		1.00
A3	9.10		9.90	D3	0.20		0.50
B1	15.40		16.40	E	2.24		2.84
B2	4.35		4.95	E1		0.70	
B3	6.00		7.40	E2		1.0×45°	
C	3.00		3.70	E3	0.35		0.65
C1	15.00		17.00	E4	2.30		3.30
C2	8.80		10.80	α (度)		30°	

## Revision History

Revision	Release	Remark
V1.0	2023/06/02	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.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.