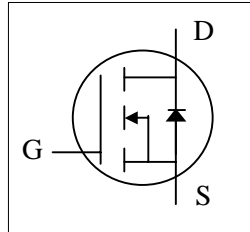




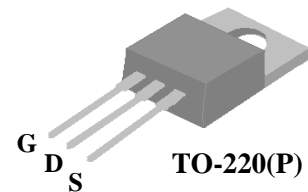
- ▼ **100% Avalanche Test**
- ▼ **Fast Switching Characteristic**
- ▼ **Simple Drive Requirement**



BV_{DSS}	600V
$R_{DS(ON)}$	1.4 Ω
I_D	6A

Description

AP3986 series are specially designed as main switching devices for universal 90~265VAC off-line AC/DC converter applications. The TO-220 type provide high blocking voltage to overcome voltage surge and sag in the toughest power system with the best combination of fast switching, ruggedized design and cost-effectiveness.



The TO-220 package is widely preferred for commercial-industrial applications. The device is suited for switch mode power supplies, DC-AC converters and high current high speed switching circuits.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	6	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	3.3	A
I_{DM}	Pulsed Drain Current ¹	20	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	92.6	W
E_{AS}	Single Pulse Avalanche Energy ²	20	mJ
I_{AR}	Avalanche Current	6	A
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Value	Unit
R_{thj-c}	Maximum Thermal Resistance, Junction-case	1.35	$^\circ C/W$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient	62	$^\circ C/W$



Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=1mA$	600	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=10V, I_D=3A$	-	-	1.4	Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=3A$	-	2.8	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=480V, V_{GS}=0V$	-	-	100	μA
	Drain-Source Leakage Current ($T_j=125^{\circ}\text{C}$)	$V_{DS}=480V, V_{GS}=0V$	-	-	250	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 30V$	-	-	± 100	nA
Q_g	Total Gate Charge ³	$I_D=3A$	-	34	55	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=300V$	-	6	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	15	-	nC
$t_{d(on)}$	Turn-on Delay Time ³	$V_{DD}=300V$	-	30	-	ns
t_r	Rise Time	$I_D=3A$	-	32	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=50\Omega, V_{GS}=10V$	-	205	-	ns
t_f	Fall Time	$R_D=100\Omega$	-	55	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	1310	2100	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	210	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	-	35	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ³	$I_S=3A, V_{GS}=0V$	-	-	1.3	V
t_{rr}	Reverse Recovery Time ³	$I_S=3A, V_{GS}=0V$	-	400	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	4.2	-	μC

Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Starting $T_j=25^{\circ}\text{C}$, $V_{DD}=50V$, $L=1mH$, $R_G=25\Omega$
- 3.Pulse test

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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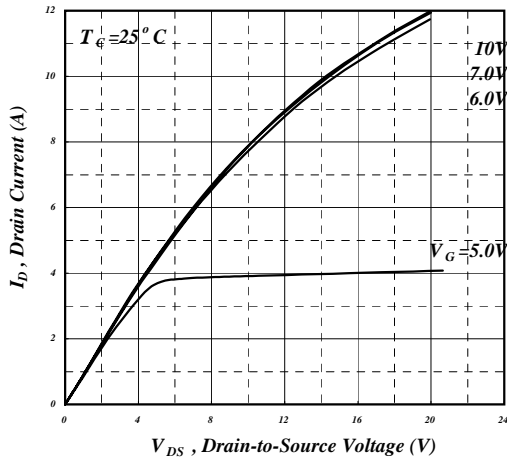


Fig 1. Typical Output Characteristics

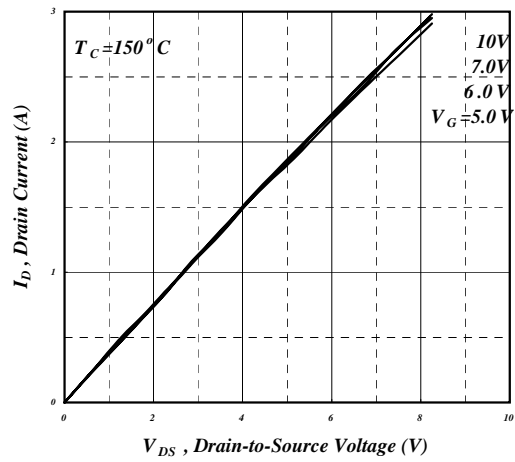


Fig 2. Typical Output Characteristics

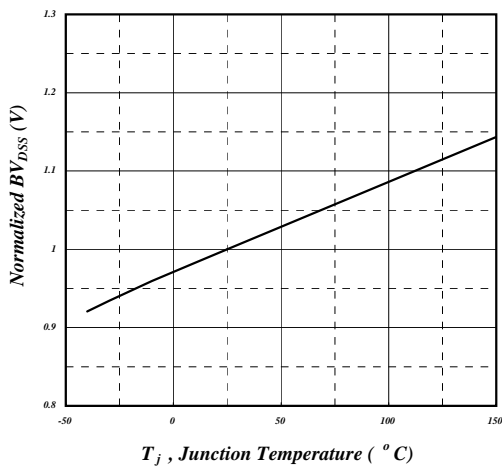


Fig 3. Normalized BV_{DSS} v.s. Junction Temperature

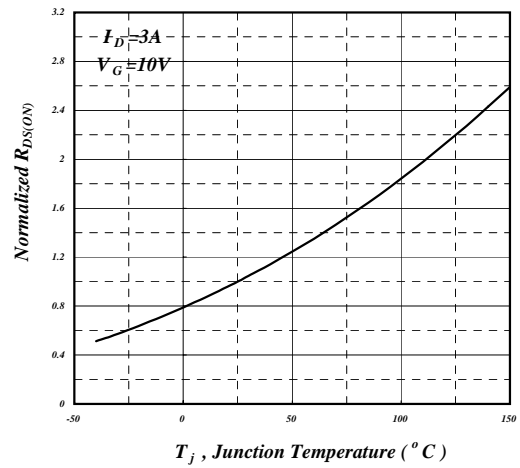


Fig 4. Normalized On-Resistance v.s. Junction Temperature

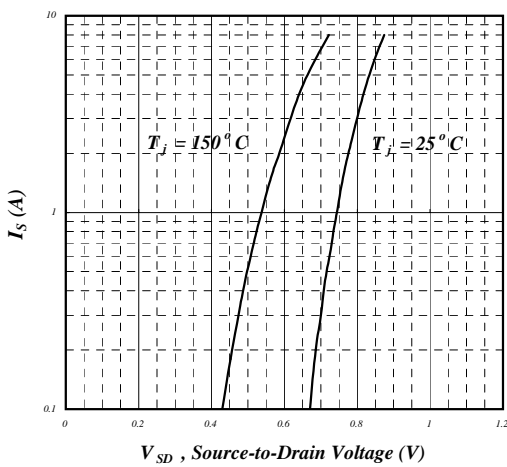


Fig 5. Forward Characteristic of Reverse Diode

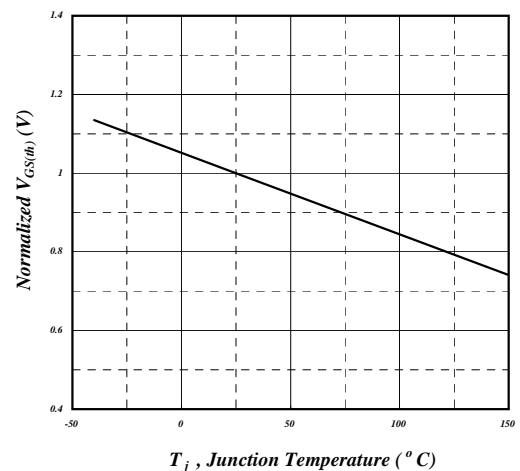


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

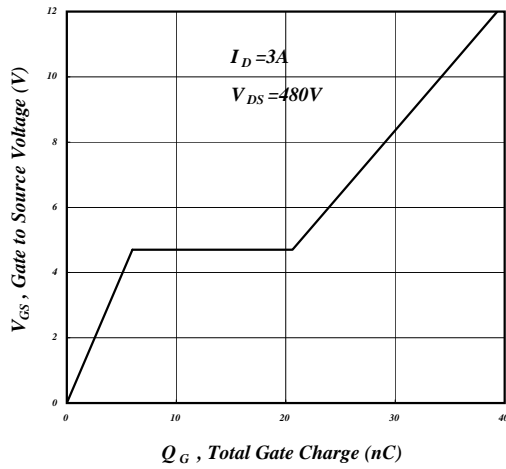


Fig 7. Gate Charge Characteristics

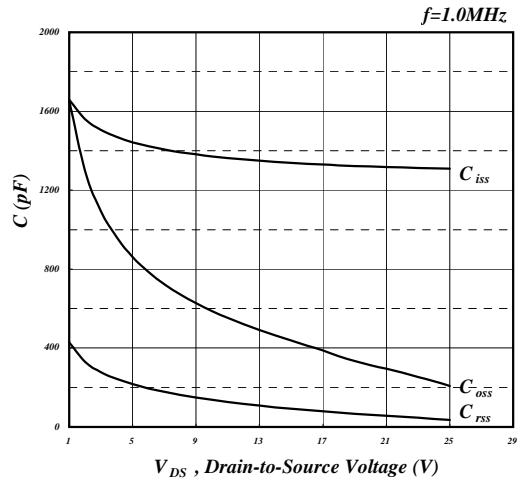


Fig 8. Typical Capacitance Characteristics

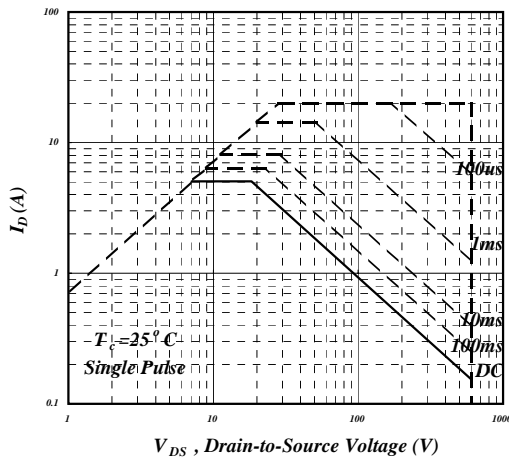


Fig 9. Maximum Safe Operating Area

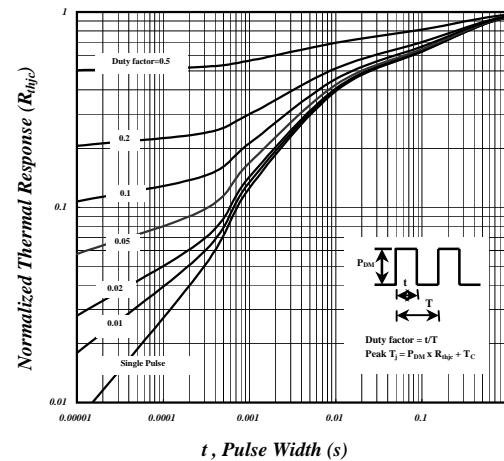


Fig 10. Effective Transient Thermal Impedance



Fig 11. Switching Time Waveform

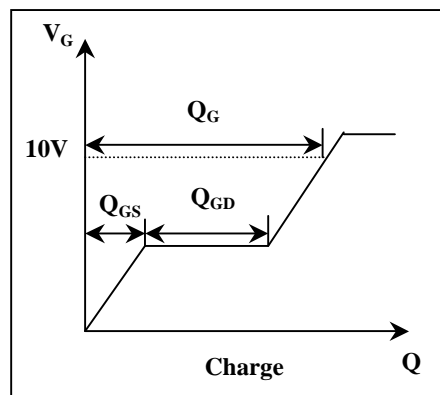
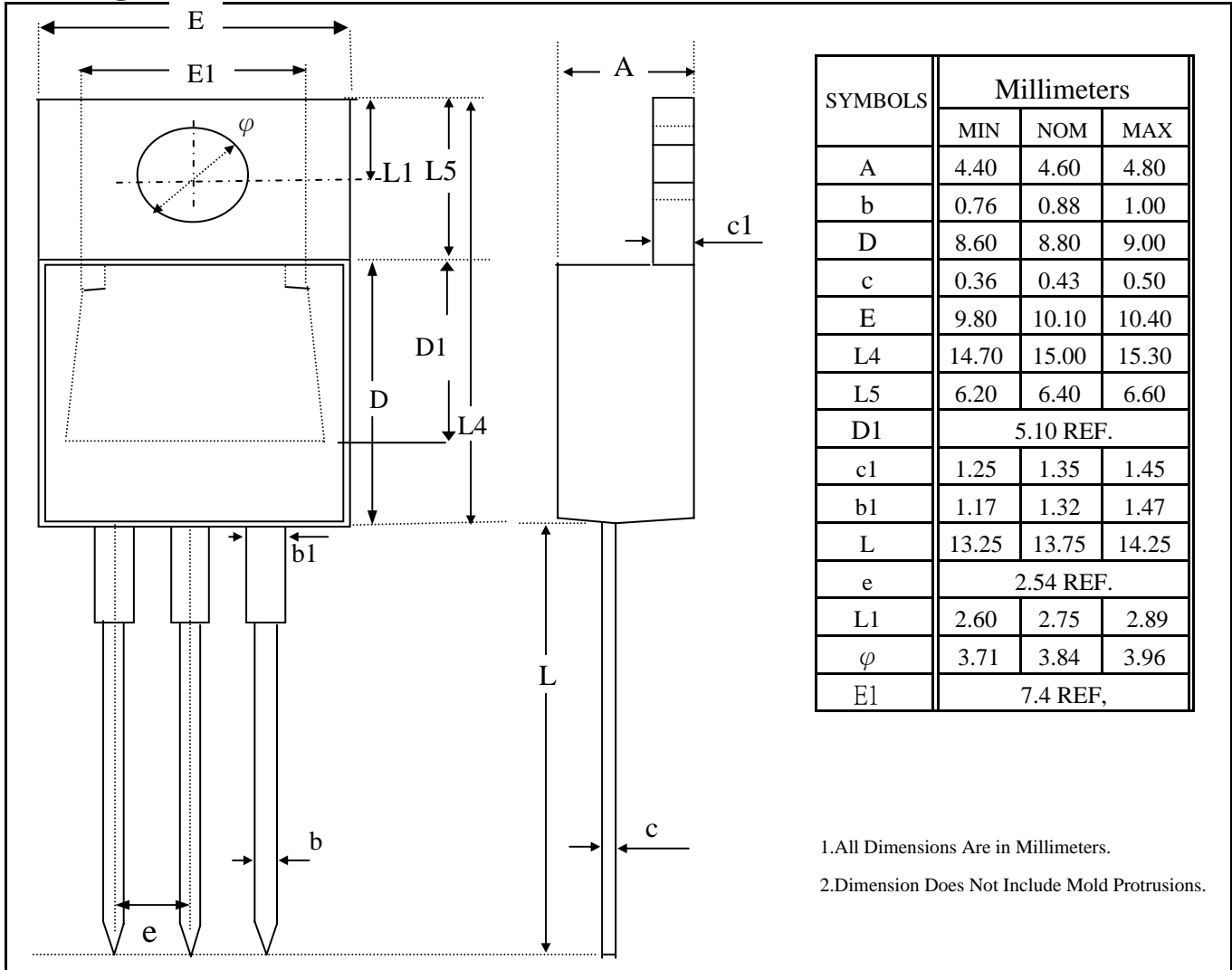


Fig 12. Gate Charge Waveform



Package Outline : TO-220



Part Marking Information & Packing : TO-220

