ALPHA & OMEGA SEMICONDUCTOR

AOT4N60/AOTF4N60/AOTF4N60L

600V,4A N-Channel MOSFET

General Description

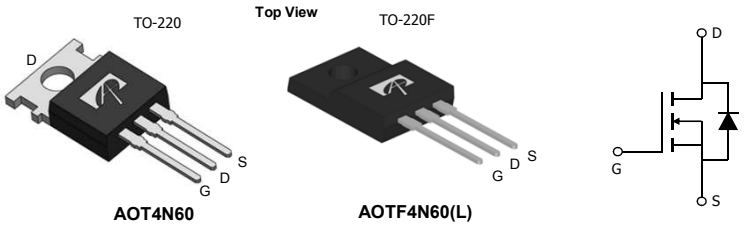
The AOT4N60 & AOTF4N60 & AOTF4N60L have been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.
By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs.

Product Summary

V_{DS}	700V@150℃
I_D (at V_{GS}=10V)	4A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 2.2Ω

100% UIS Tested
100% R_g Tested

RoHS Compliant



AOT4N60 AOTF4N60(L)

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOT4N60	AOTF4N60	AOTF4N60L	Units
Drain-Source Voltage		V_{DS}	600			V
Gate-Source Voltage		V_{GS}	±30			V
Continuous Drain Current	T_C=25°C	I_D	4	4*	4*	A
	T_C=100°C		2.7	2.7*	2.7*	
Pulsed Drain Current [C]		I_{DM}	16			
Avalanche Current [C]		I_{AR}	2.5			A
Repetitive avalanche energy [C]		E_{AR}	94			mJ
Single plused avalanche energy [G]		E_{AS}	188			mJ
MOSFET dv/dt ruggedness		dv/dt	50			V/ns
Peak diode recovery dv/dt			5			
Power Dissipation [B]	T_C=25°C	P_D	104	35	25	W
	Derate above 25°C		0.83	0.28	0.20	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150			°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300			°C

Thermal Characteristics

Parameter	Symbol	AOT4N60	AOTF4N60	AOTF4N60L	Units
Maximum Junction-to-Ambient [A,D]	$R_{\theta JA}$	65	65	65	°C/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	0.5	--	--	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	1.2	3.6	5	°C/W

* Drain current limited by maximum junction temperature.

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250µA, V_{GS}=0V, T_J=25°C	600			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		700		
BV_{DSS} /ΔTJ	Breakdown Voltage Temperature Coefficient	I_D=250µA, V_{GS}=0V		0.69		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V, V_{GS}=0V			1	µA
		V_{DS}=480V, T_J=125°C			10	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±30V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=5V I_D=250µA	3	4	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=2A		1.9	2.2	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=2A		7.4		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.77	1	V
I_S	Maximum Body-Diode Continuous Current				4	A
I_{SM}	Maximum Body-Diode Pulsed Current				16	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	400	511	615	pF
C_{oss}	Output Capacitance		40	51	65	pF
C_{rss}	Reverse Transfer Capacitance		3.5	4.4	5.3	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	3.3	4.2	6.3	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=4A		15	18	nC
Q_{gs}	Gate Source Charge			3	3.6	nC
Q_{gd}	Gate Drain Charge			7.6	9.1	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=300V, I_D=4A, R_G=25Ω		20.2	30	ns
t_r	Turn-On Rise Time			28.7	42	ns
$t_{D(off)}$	Turn-Off DelayTime			36	51	ns
t_f	Turn-Off Fall Time			27	40	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=4A,dI/dt=100A/µs,V_{DS}=100V		212	254	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=4A,dI/dt=100A/µs,V_{DS}=100V		1.6	1.9	µC

A. The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A=25° C.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C, Ratings are based on low frequency and duty cycles to keep initial T_J =25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300 µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.
G. L=60mH, I_{AS}=2.5A, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

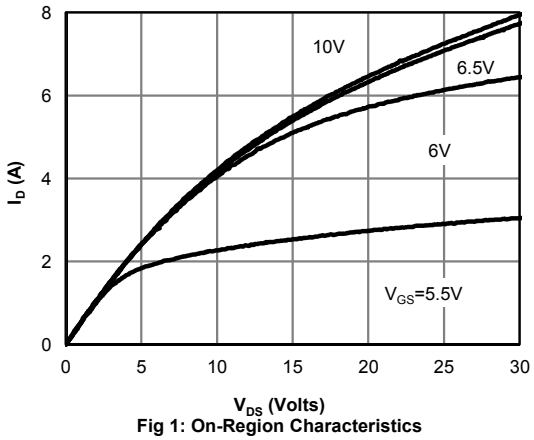


Fig 1: On-Region Characteristics

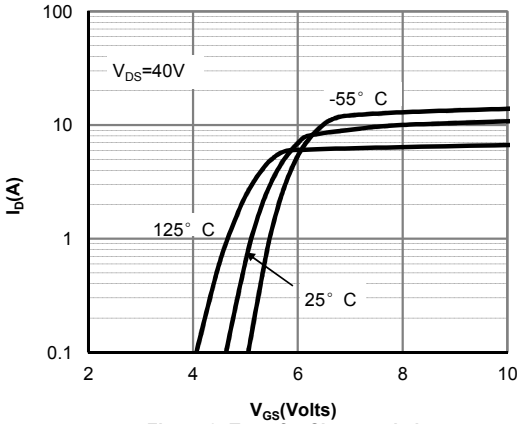


Figure 2: Transfer Characteristics

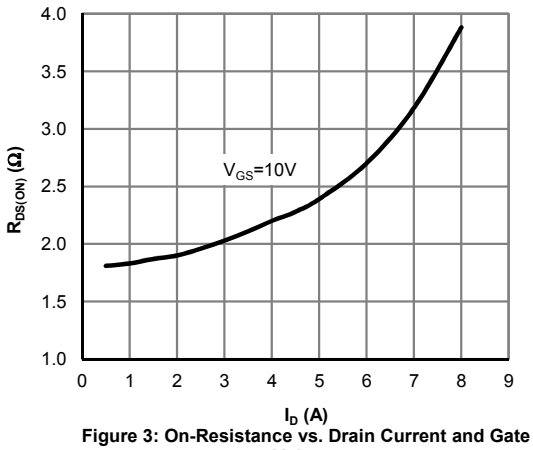


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

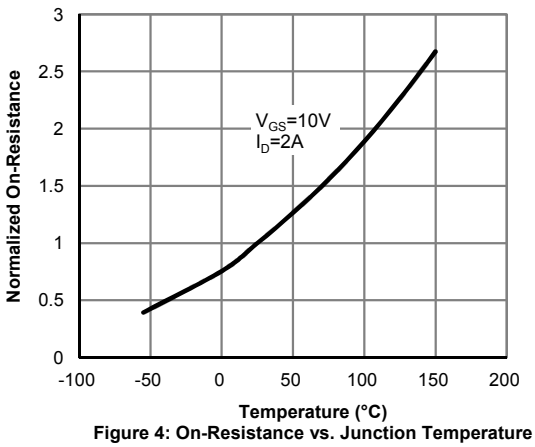


Figure 4: On-Resistance vs. Junction Temperature

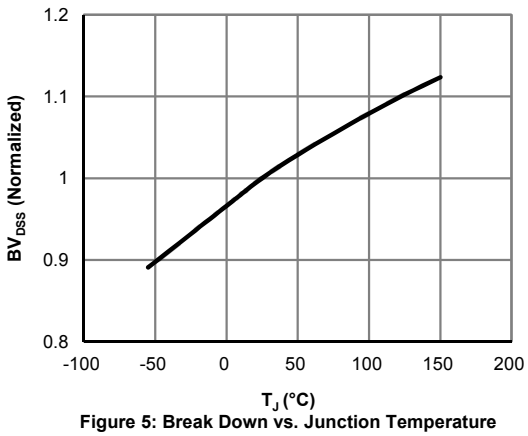


Figure 5: Break Down vs. Junction Temperature

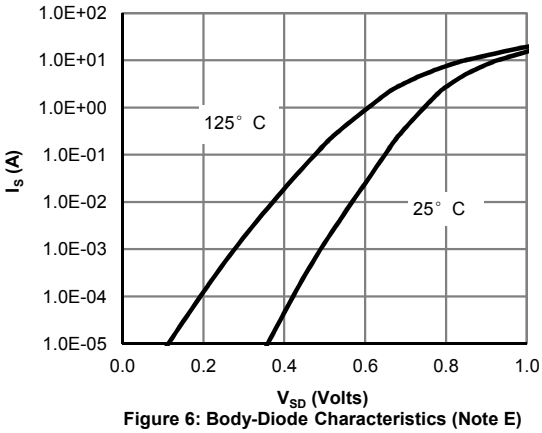


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

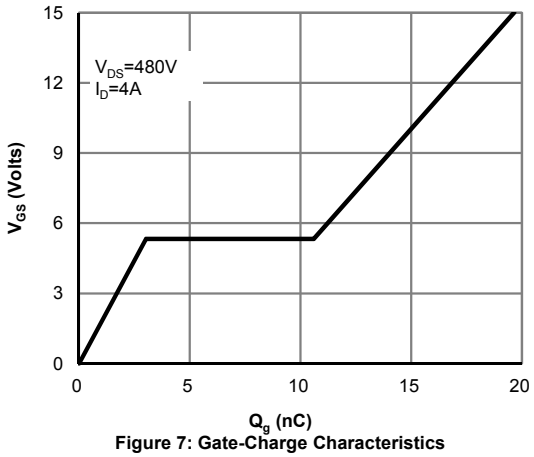


Figure 7: Gate-Charge Characteristics

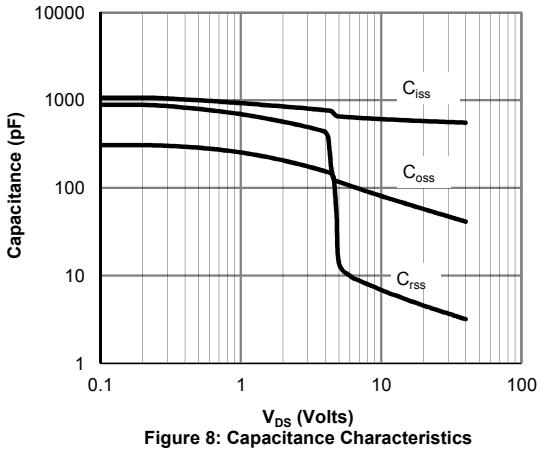


Figure 8: Capacitance Characteristics

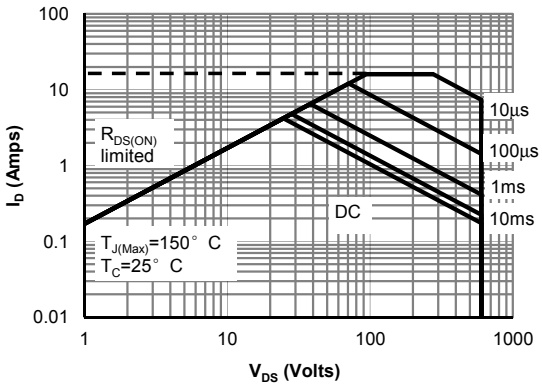


Figure 9: Maximum Forward Biased Safe Operating Area for AOT4N60 (Note F)

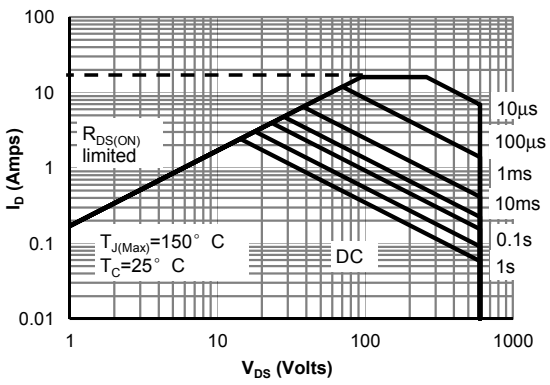


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF4N60 (Note F)

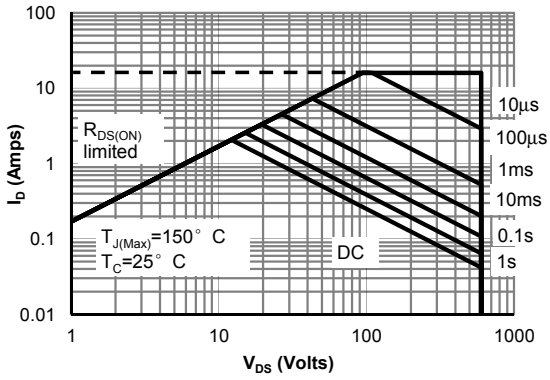


Figure 11: Maximum Forward Biased Safe Operating Area for AOTF4N60L (Note F)

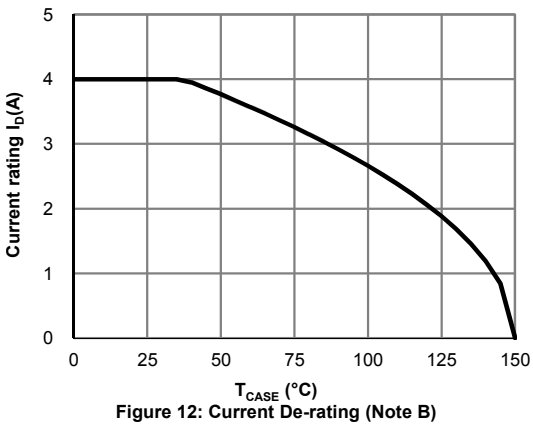


Figure 12: Current De-rating (Note B)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

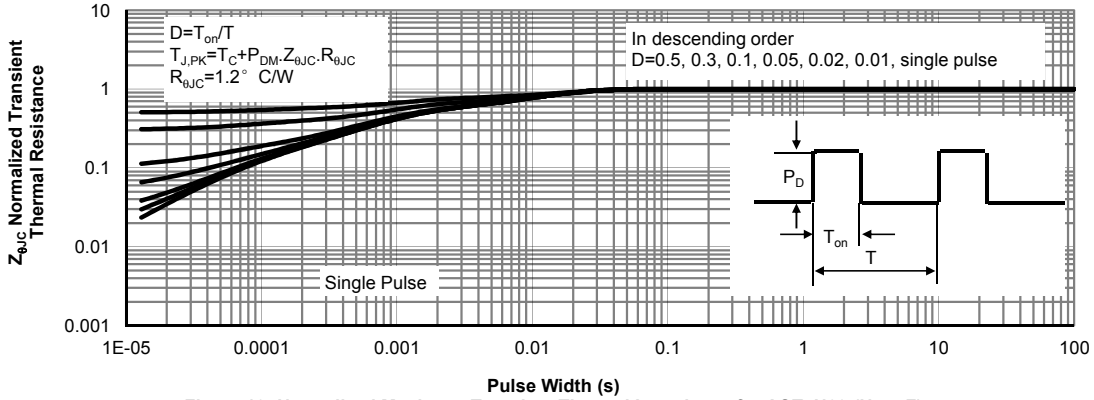


Figure 13: Normalized Maximum Transient Thermal Impedance for AOT4N60 (Note F)

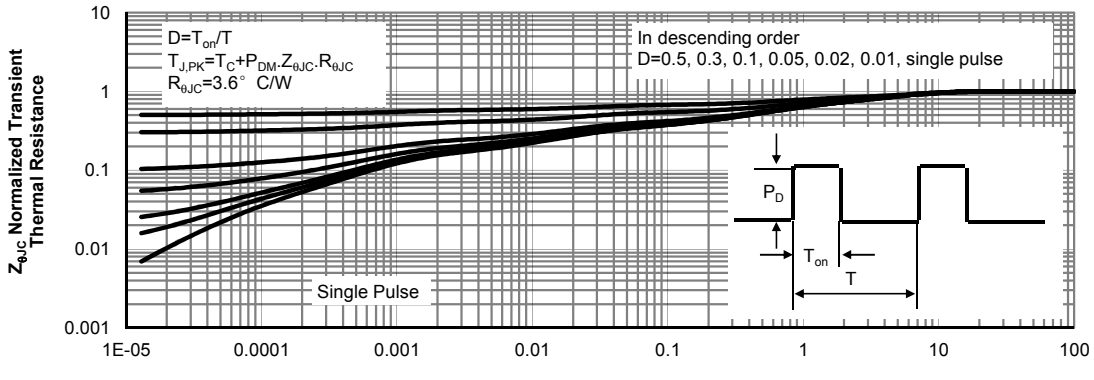


Figure 14: Normalized Maximum Transient Thermal Impedance for AOTF4N60 (Note F)

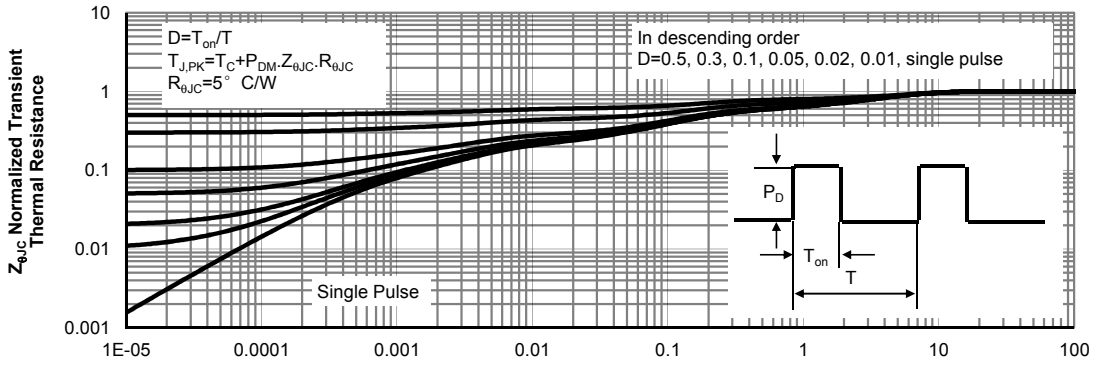
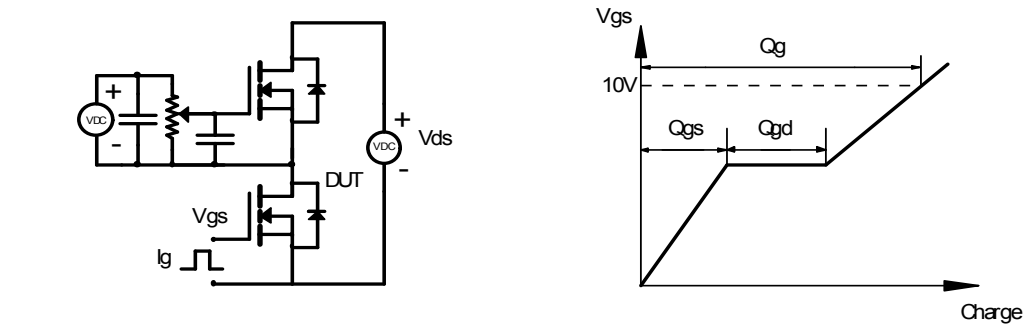
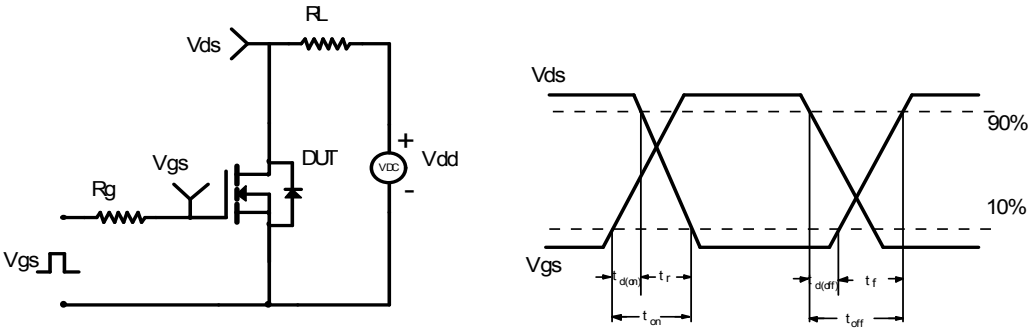


Figure 15: Normalized Maximum Transient Thermal Impedance for AOTF4N60L (Note F)

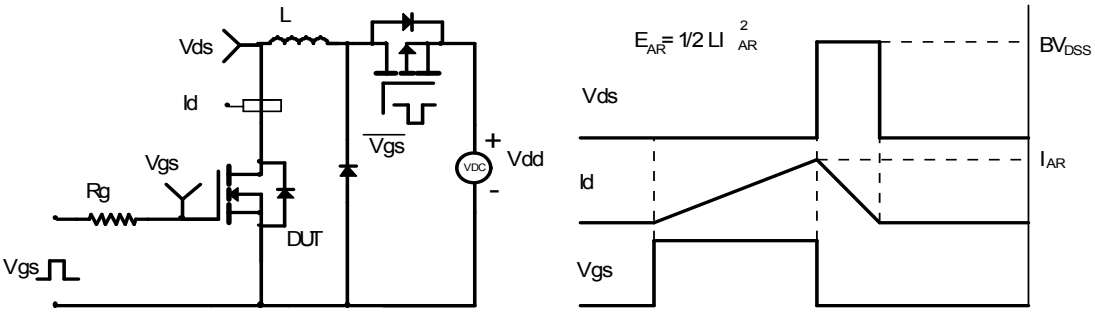
Gate Charge Test Circuit & Waveform



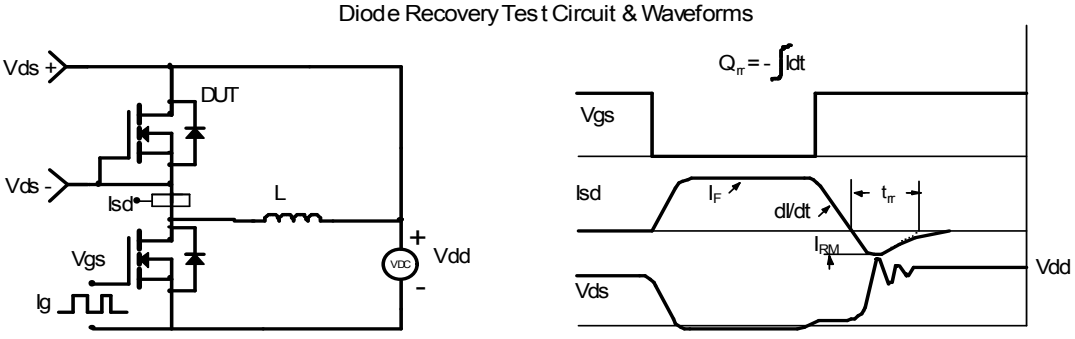
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



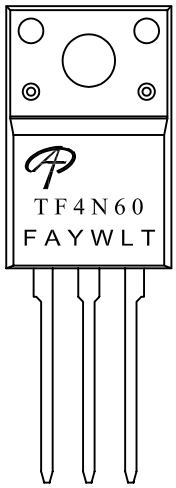
Diode Recovery Test Circuit & Waveforms



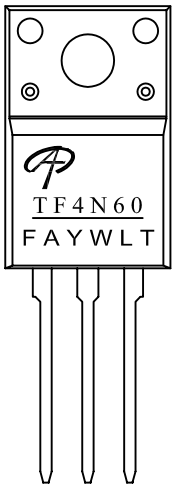
ALPHA & OMEGA SEMICONDUCTOR

Document No.	PD-00915
Version	A
Title	AOTF4N60 Marking Description

TO220F PACKAGE MARKING DESCRIPTION



Standard product



Green product

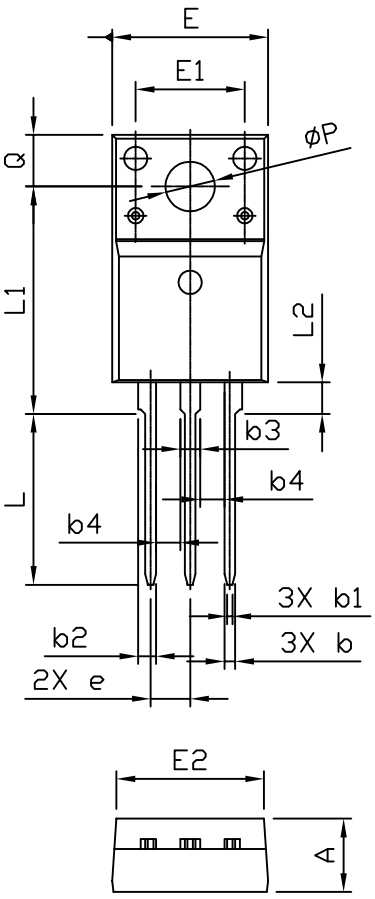
NOTE:
LOGO - AOS Logo
TF4N60 - Part number code
F - Fab code
A - Assembly location code
Y - Year code
W - Week code
L&T - Assembly lot code

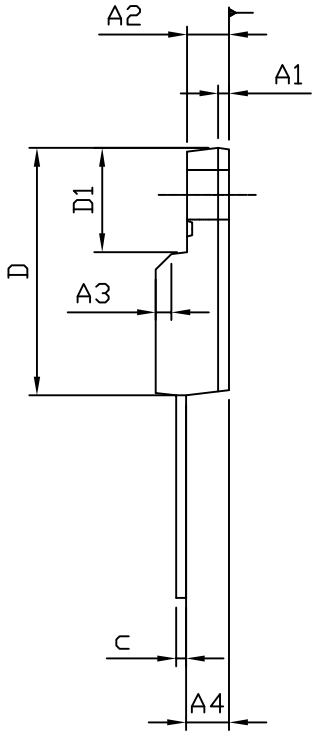
PART NO.	DESCRIPTION	CODE
AOTF4N60	Standard product	TF4N60
AOTF4N60L	Green product	TF4N60

ALPHA & OMEGA SEMICONDUCTOR

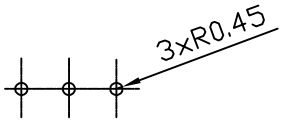
Document No.	P0-00059
Version	E

TO220F PACKAGE OUTLINE





RECOMMENDATION OF HOLE PATTERN



UNIT: mm

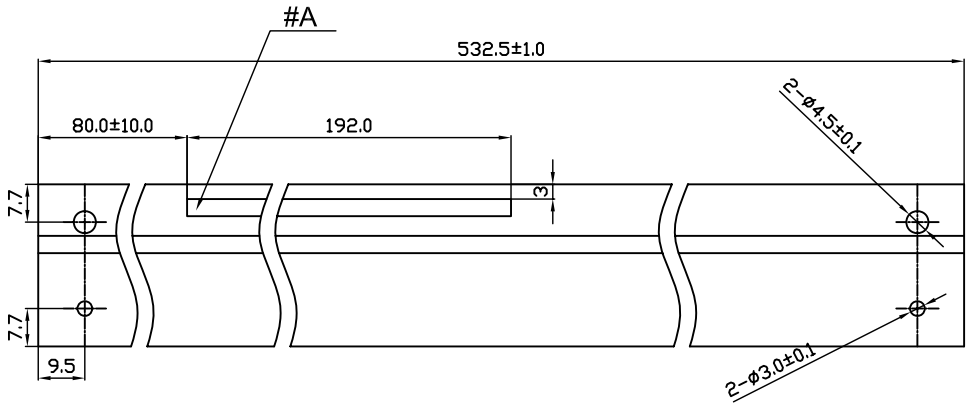
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.50	4.70	4.90	0.177	0.185	0.193
A1	---	0.70	---	---	0.028	---
A2	2.34	2.54	2.74	0.092	0.100	0.108
A3		1X45°			1X45°	
A4	2.66	2.76	2.86	0.105	0.106	0.113
b	0.59	0.69	0.79	0.023	0.027	0.031
b1	0.25	0.35	0.45	0.010	0.014	0.018
b2	1.14	1.24	1.29	0.045	0.049	0.051
b3	1.28	1.38	1.43	0.050	0.054	0.056
b4		1.40 MIN.			0.055 MIN.	
c	0.59	0.64	0.74	0.023	0.025	0.029
D	15.67	15.87	16.07	0.617	0.625	0.633
D1	6.48	6.68	6.88	0.255	0.263	0.271
e		2.54 BSC			0.100 BSC.	
E	9.96	10.16	10.36	0.392	0.400	0.408
E1	---	7.00	---	---	0.276	---
E2	9.26	9.46	9.66	0.365	0.372	0.380
L	10.76	10.96	11.16	0.424	0.431	0.439
L1	14.39	14.59	14.79	0.567	0.574	0.582
L2	1.70	2.03	2.20	0.067	0.080	0.087
Q	3.20	3.30	3.40	0.126	0.130	0.134
øP	3.08	3.18	3.28	0.121	0.125	0.129

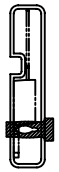
NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
   MOLD FLASH SHOULD BE LESS THAN 6 MIL.
2. TOLERANCE 0.100 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

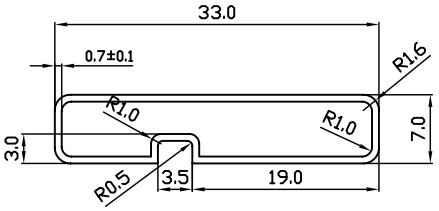
ALPHA & OMEGA SEMICONDUCTOR

REV.	DATE	DESCRIPTION	DRG.
A		NEW ISSUE	

TO220F/TO220FL PLASTIC TUBE DRAWING

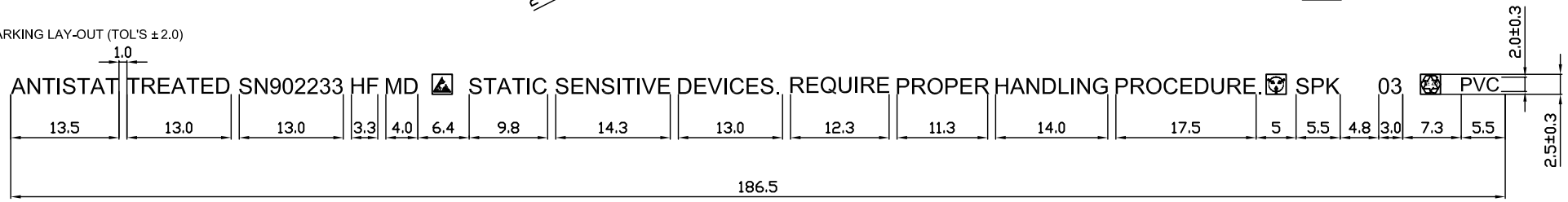






2:1

#A MARKING LAY-OUT (TOL'S ±2.0)



2:1

NOTE

1. TUBE
   - MATERIAL : P.V.C
   - COLOR : TRANSPARENCY, RED, YELLOW
   - MARKING #A : 6 MONTHS, BLACK COLOR
     LETTER STYLE : Arial
   - CAMBAR : 1.5 MAX
2. PIN
   - MATERIAL: NYLON
   - COLOR : GREEN (ONE PIN MUST BE INSERTED IN LEFT-SIDE OF " ANTISTATIC~" AND ANOTHER PIN IS FREE.)
3. ALL UNSPECIFICATED SPECIFICATIONS FOLLOW TUBE GENERAL SPEC.
   UNSPECIFICATED TOLERANCE ± 0.2
4. PACKING Q'TY :

PKG	Q'TY(PCS)
TO220F/ TO220FL	50

ALPHA & OMEGA SEMICONDUCTOR		TITLE: TO220F/TO220FL TUBE DRAWING	
DRAWN BY	SIGNATURE		
APPROVED BY	SIGNATURE	UNIT: MM	PAGE: 1 OF 1
SCALE: N.T.S.	PROJECTION	DRAWING NUMBER: TR-00061	VENDOR CODE: N / REV.: A

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET ***category:***

Click to view products by Alpha & Omega ***manufacturer:***

Other Similar products are found below :

614233C 648584F MCH3443-TL-E MCH6422-TL-E FDPF9N50NZ FW216A-TL-2W FW231A-TL-E APT5010JVR NTNS3A92PZT5G IRF100S201 JANTX2N5237 2SK2464-TL-E 2SK3818-DL-E FCA20N60_F109 FDZ595PZ STD6600NT4G FSS804-TL-E 2SJ277-DL-E 2SK1691-DL-E 2SK2545(Q,T) 405094E 423220D MCH6646-TL-E TPCC8103,L1Q(CM 367-8430-0972-503 VN1206L 424134F 026935X 051075F SBVS138LT1G 614234A 715780A NTNS3166NZT5G 751625C 873612G IRF7380TRHR IPS70R2K0CEAKMA1 RJK60S3DPP-E0#T2 RJK60S5DPK-M0#T0 APT5010JVFR APT12031JFLL APT12040JVR DMN3404LQ-7 NTE6400 JANTX2N6796U JANTX2N6784U JANTXV2N5416U4 SQM110N05-06L-GE3 SIHF35N60E-GE3 2SK2614(TE16L1,Q)