

## AOT430

### N-Channel Enhancement Mode Field Effect Transistor

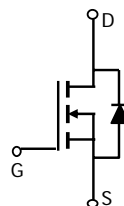
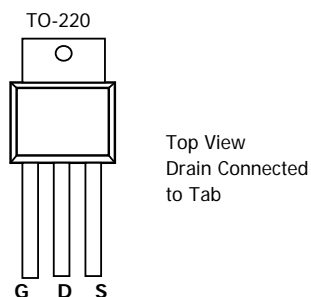
#### General Description

The AOT430 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOT430 is Pb-free (meets ROHS & Sony 259 specifications).*

#### Features

$V_{DS}$  (V) = 75V  
 $I_D$  = 80 A ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 11.5m\Omega$  ( $V_{GS} = 10V$ )

**UIS TESTED!**



#### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	75	V
Gate-Source Voltage	$V_{GS}$	$\pm 25$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}^G$	80
		$T_C=100^\circ\text{C}$	78
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	200	A
Avalanche Current <sup>C</sup>	$I_{AR}$	45	A
Repetitive avalanche energy $L=0.3\text{mH}^C$	$E_{AR}$	300	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	268
		$T_C=100^\circ\text{C}$	134
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

#### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	45	60	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	0.45	0.56	$^\circ\text{C/W}$
Steady-State				

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	75			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=60\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 25\text{V}$			1	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2	2.7	4	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$	200			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=30\text{A}$ $T_J=125^\circ\text{C}$		9.8 16.0	11.5 19.0	$\text{m}\Omega$
$g_{FS}$	Transconductance	$V_{DS}=5\text{V}$ , $I_D=80\text{A}$		90		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.7	1	V
$I_S$	Maximum Body-Diode Continuous Current <sup>G</sup>				80	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$		4700		pF
$C_{oss}$	Output Capacitance			400		pF
$C_{riss}$	Reverse Transfer Capacitance			180		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		3		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $I_D=30\text{A}$		114		nC
$Q_{gs}$	Gate Source Charge			33		nC
$Q_{gd}$	Gate Drain Charge			18		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $R_L=1\Omega$ , $R_{GEN}=3\Omega$		21		ns
$t_r$	Turn-On Rise Time			39		ns
$t_{D(off)}$	Turn-Off Delay Time			70		ns
$t_f$	Turn-Off Fall Time			24		ns
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=30\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		53	
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=30\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		143		nC

A: The value of  $R_{\theta JA}$  is measured with the device in a still air environment with  $T_A=25^\circ\text{C}$ .

B: The power dissipation  $P_D$  is based on  $T_{J(MAX)}=175^\circ\text{C}$ , 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  $T_{J(MAX)}=175^\circ\text{C}$ .

D: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(MAX)}=175^\circ\text{C}$ .

G: The maximum current rating is limited by bond-wires.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

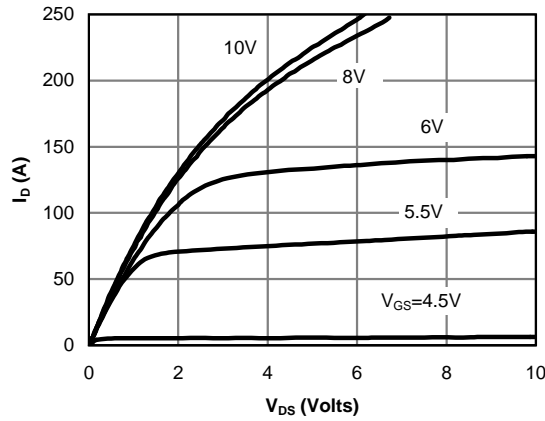


Figure 1: On-Region Characteristics

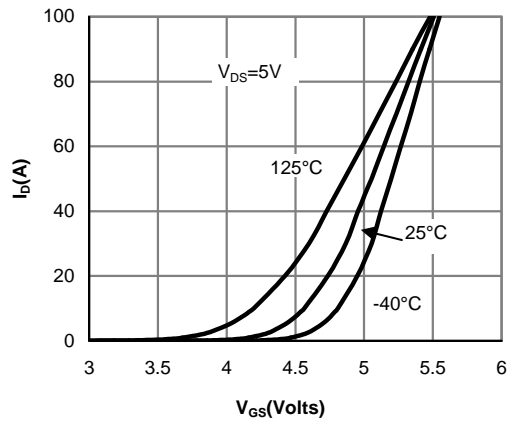


Figure 2: Transfer Characteristics

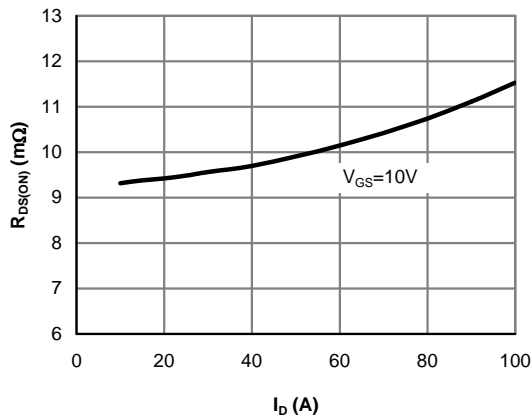


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

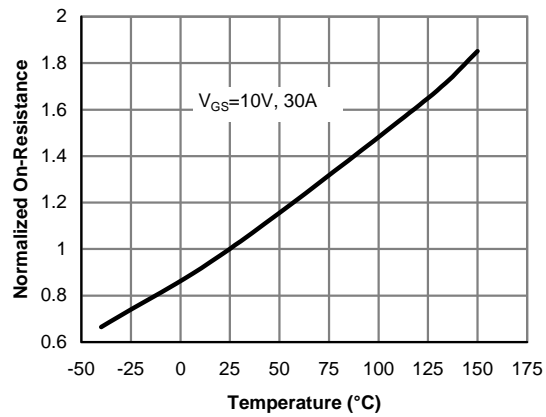


Figure 4: On-Resistance vs. Junction Temperature

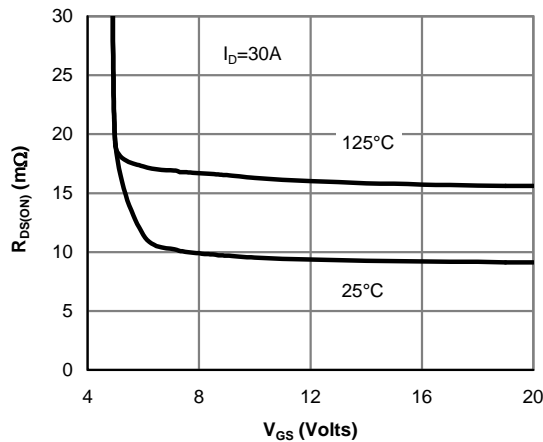


Figure 5: On-Resistance vs. Gate-Source Voltage

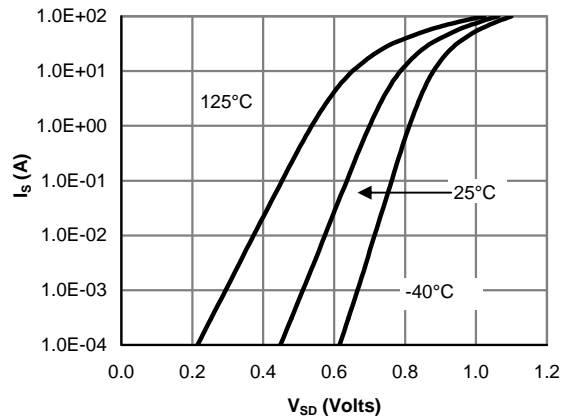


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

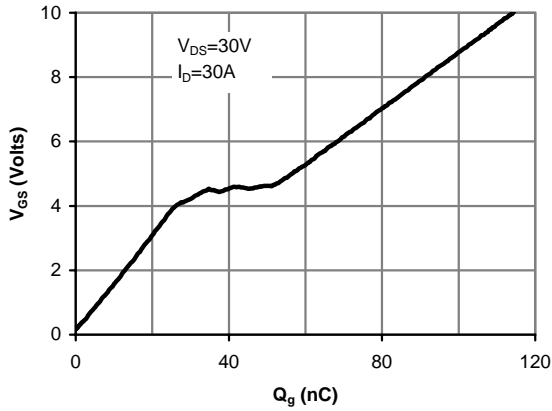


Figure 7: Gate-Charge Characteristics

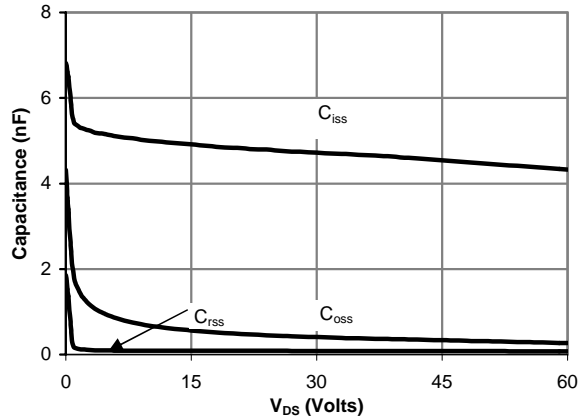


Figure 8: Capacitance Characteristics

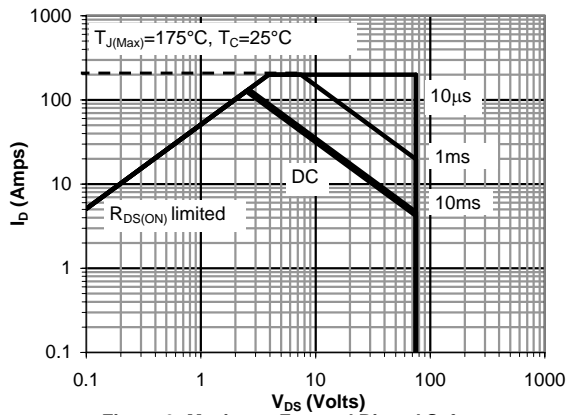


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

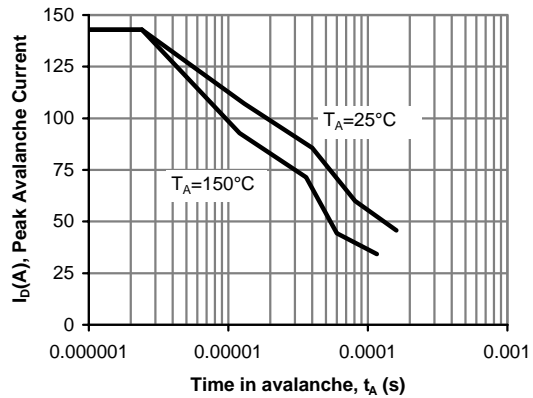


Figure 10: Single Pulse Avalanche capability

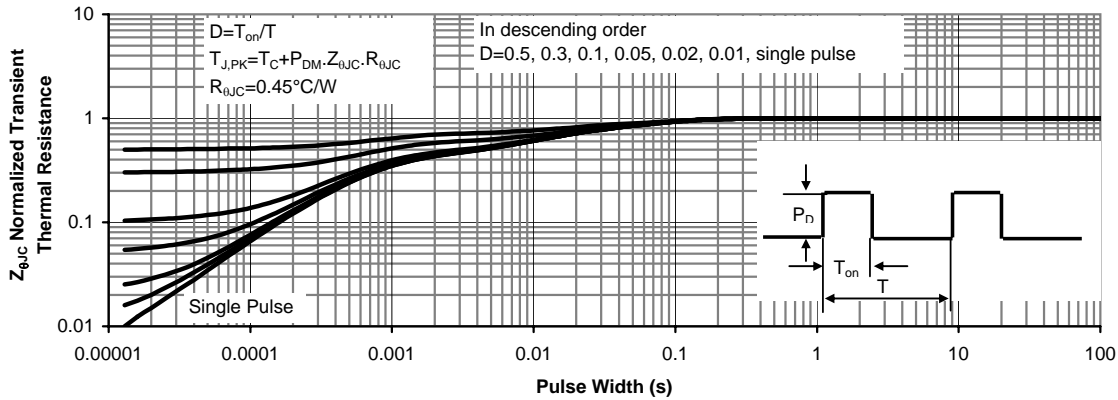


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

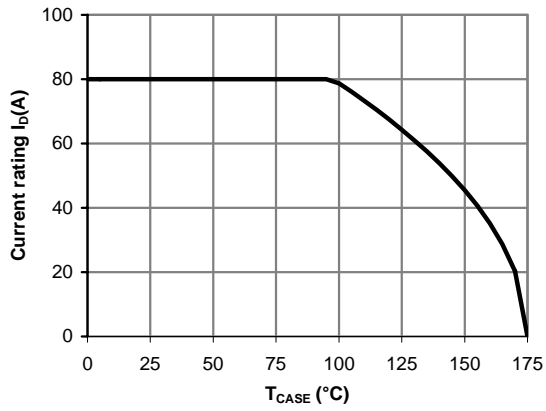


Figure 12: Current De-rating (Note B)

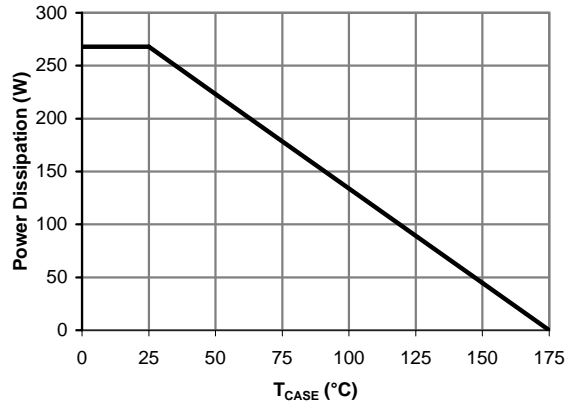


Figure 13: Power De-rating (Note B)