

IXTY2P50PA

–500 V, –2 A PolarP™ MOSFET

P-Channel Enhancement Mode



Features & Benefits:

- AEC Q101 Qualified
- Avalanche Rated
- Rugged PolarP™ Process
- Low Package Inductance
- Easy to Mount
- Space Savings

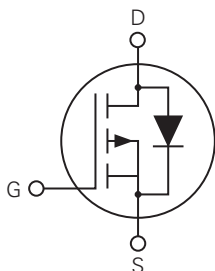
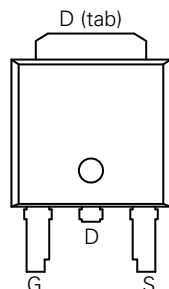
Applications:

- High-side Switches
- Push Pull Amplifiers
- DC Choppers
- Automatic Test Equipment
- Current Regulators

Product Summary

Characteristics	Value	Unit
V_{DSS}	–500	V
$R_{DS(on),max}$	4.2	Ω
I_{D25}	–2	A

Pinout Diagram (TO-252)



G: Gate; **D:** Drain; **S:** Source; **tab:** Drain

Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units
V_{DSS}	Drain-Source Voltage	$T_J = 25\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$	–500	V
V_{GSS}	Gate-Source Voltage	Continuous	± 20	V
V_{GSM}		Transient	± 30	
I_{D25}	Drain Current	$T_C = 25\text{ }^{\circ}\text{C}$	–2	A
I_{DM}		$T_C = 25\text{ }^{\circ}\text{C}$, Pulse width limited by T_{JM}	–6	
I_A	Avalanche Current	$T_C = 25\text{ }^{\circ}\text{C}$	–2	A
E_{AS}	Avalanche Energy	$T_C = 25\text{ }^{\circ}\text{C}$	150	mJ
dV/dt	Reverse Diode dV/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150\text{ }^{\circ}\text{C}$	10	V/ns
P_D	Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	58	W
T_J	Operating Junction Temperature	–	–55 to +150	$^{\circ}\text{C}$
T_{JM}	Maximum Junction Temperature	–	150	
T_{stg}	Storage Temperature	–	–55 to +150	
T_{sld}	Soldering Temperature	Plastic Body for 10 s	260	$^{\circ}\text{C}$
W	Weight	–	0.35	g

Thermal Characteristics

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th, JC}$	Thermal Resistance, Junction-to-Case	–	–	2.15	$^{\circ}\text{C}/\text{W}$

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

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = -250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	–500	–	–	V
$V_{GS(th)}$	Gate Threshold Voltage	$I_D = -50\text{ }\mu\text{A}$, $V_{GS} = V_{DS}$	–2.5	–	–4.5	V
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	–	–	± 50	nA
I_{DSS}	Drain-Source Current	$V_{DS} = V_{DSS}$, $V_{GS} = 0\text{ V}$	–	–	–1	μA
		$V_{DS} = V_{DSS}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$	–	–	–5	
$R_{DS(on)}$	Drain-Source On-Resistance ¹	$V_{GS} = -10\text{ V}$, $I_D = 0.5 \times I_{D25}$	–	–	4.2	Ω

Note 1: Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle, $d \leq 2\%$

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

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
g_{fs}	Transconductance ¹	$V_{DS} = -10\text{ V}$, $I_D = 0.5 \times I_{D25}$	1.4	2.4	–	S
C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	–	600	–	pF
C_{oss}	Output Capacitance		–	70	–	
C_{rss}	Reverse Transfer Capacitance		–	12	–	
$Q_{g(on)}$	Total Gate Charge	$V_{GS} = -10\text{ V}$, $V_{DS} = 0.5 \times V_{DSS}$, $I_D = 0.5 \times I_{D25}$	–	11.9	–	nC
Q_{gs}	Gate-Source Charge		–	4.0	–	
Q_{gd}	Gate-Drain Charge		–	4.3	–	
$t_{d(on)}$	Turn-on Delay Time	Resistive Switching $V_{GS} = -10\text{ V}$, $V_{DS} = 0.5 \times V_{DSS}$, $I_D = 0.5 \times I_{D25}$, $R_{G(ext)} = 50\text{ }\Omega$	–	26	–	ns
t_r	Rise Time		–	62	–	
$t_{d(off)}$	Turn-off Delay Time		–	54	–	
t_f	Fall Time		–	66	–	

Note 1: Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle, $d \leq 2\%$

Source-Drain Diode Characteristics ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
I_S	Continuous Diode Forward Current	$V_{GS} = 0\text{ V}$	–	–	-2	A
I_{SM}	Diode Pulse Current	Repetitive, Pulse width limited by T_{JM}	–	–	-8	A
V_{SD}	Diode Forward Voltage ¹	$I_F = -2\text{ A}$, $V_{GS} = 0\text{ V}$	–	–	-2.8	V
t_{rr}	Reverse Recovery Time	$I_F = -1\text{ A}$, $-di/dt = -100\text{ A}/\mu\text{s}$, $V_r = -100\text{ V}$, $V_{GS} = 0\text{ V}$	–	300	–	ns
Q_{rm}	Reverse Recovery Charge		–	3.9	–	μC
I_{rm}	Reverse Recovery Current		–	-26	–	A

Note 1: Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle, $d \leq 2\%$

Characteristic Curves

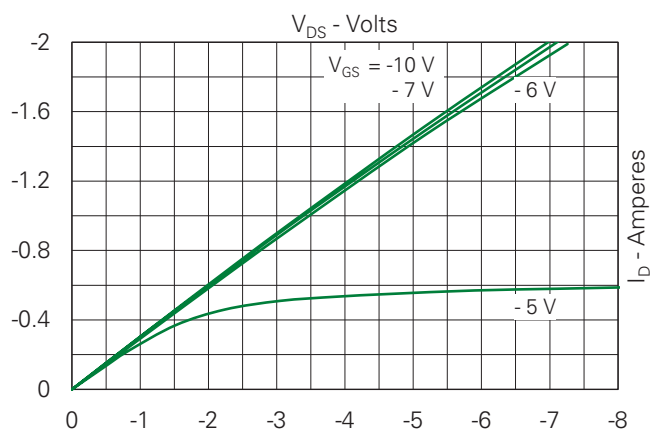
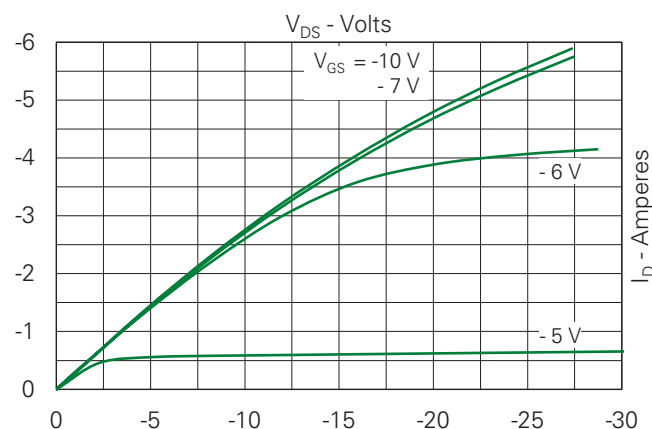
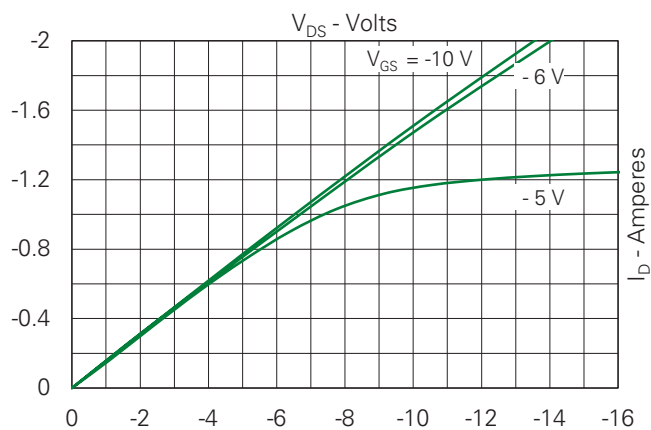
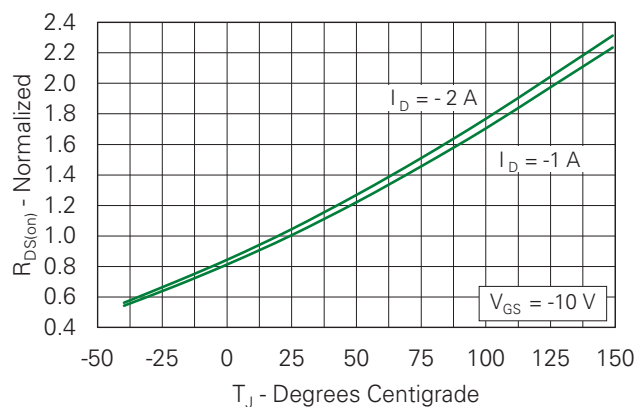
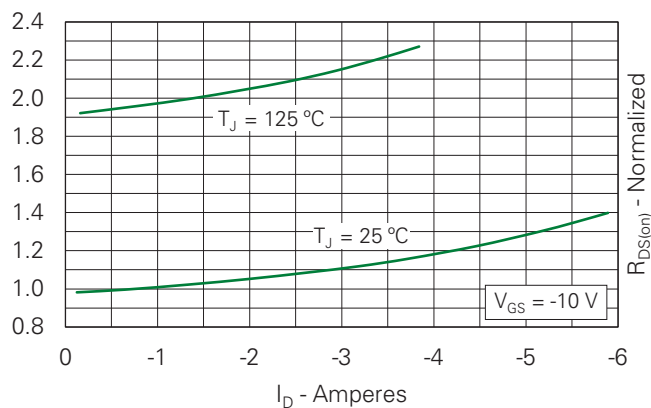
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$ Fig. 4. $R_{DS(on)}$ Normalized to $I_D = -1\text{ A}$ Value vs. Junction TemperatureFig. 5. $R_{DS(on)}$ Normalized to $I_D = -1\text{ A}$ Value vs. Drain Current

Fig. 6. Maximum Drain Current vs. Case Temperature

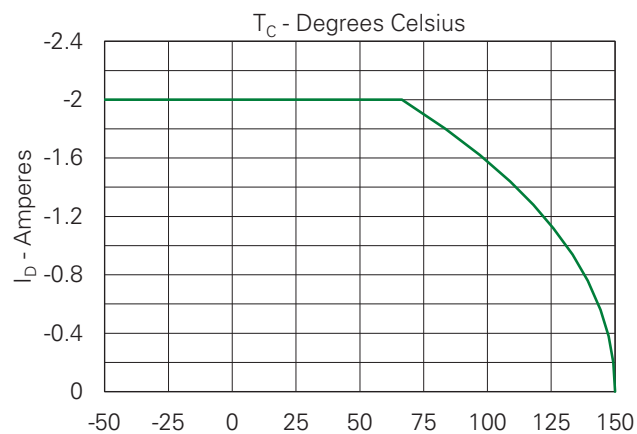


Fig. 7. Input Admittance

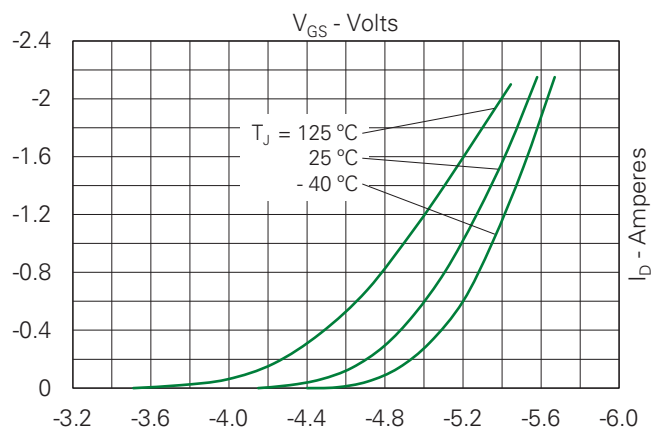


Fig. 8. Transconductance

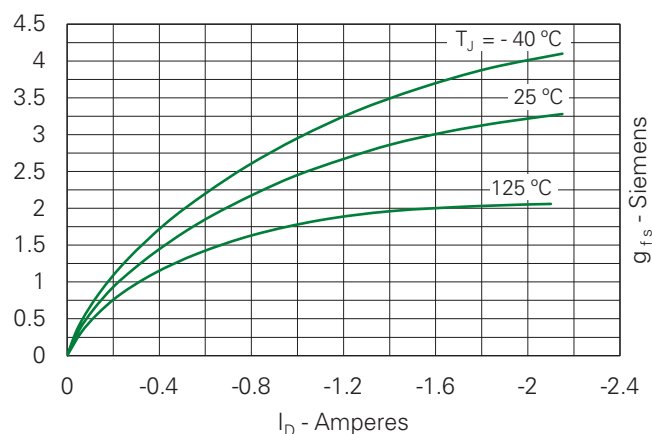


Fig. 9. Forward Voltage Drop of Intrinsic Diode

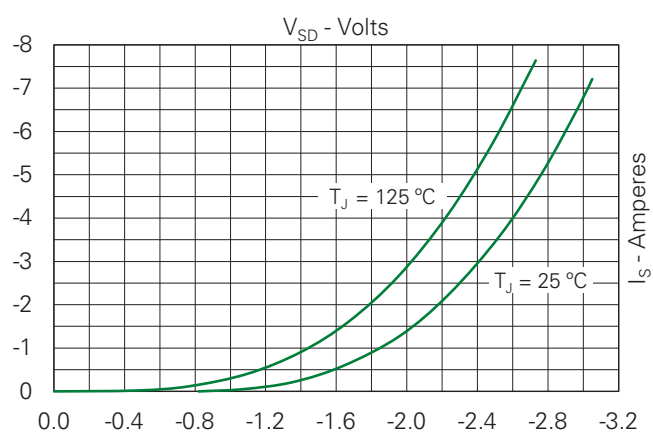


Fig. 10. Gate Charge

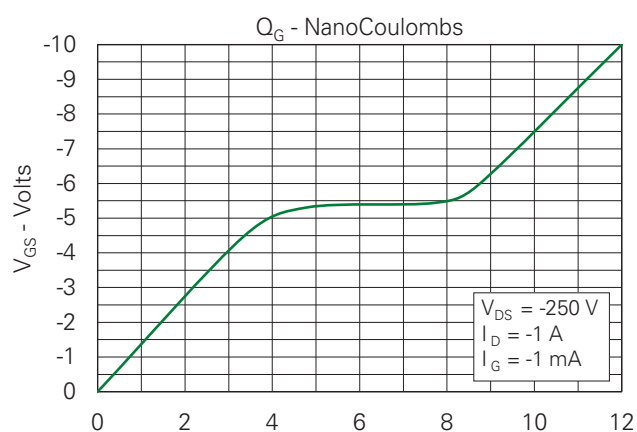


Fig. 11. Capacitance

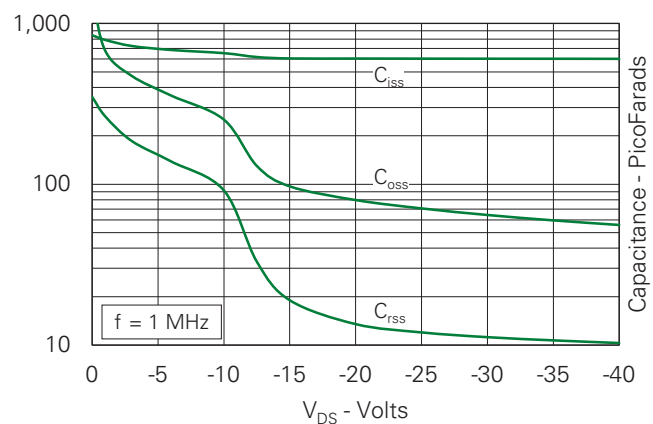
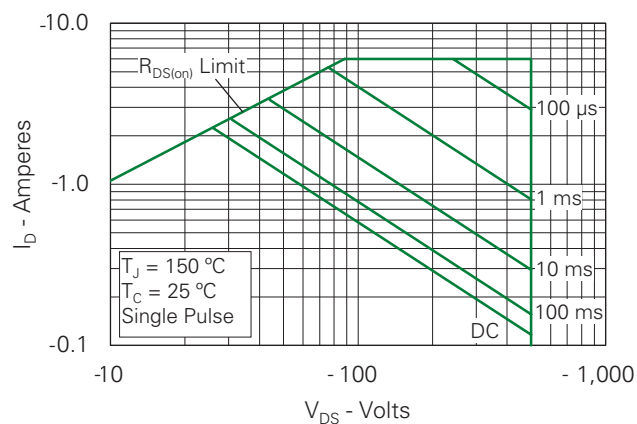


Fig. 12. Forward-Bias Safe Operating Area



The graph shows the relationship between pulse width and junction temperature rise for a 100W MOSFET. The y-axis is logarithmic, representing Z_{ThJC} in Kelvin/Watt, ranging from 0.01 to 10. The x-axis is also logarithmic, representing pulse width in seconds, ranging from 0.00001 to 10. The curve starts at approximately 0.025 K/W at 0.00001s and rises to a plateau of about 2.5 K/W for pulse widths of 1 second or more.

Pulse Width - Seconds	Z_{ThJC} - Kelvin / Watt
0.00001	0.025
0.0001	0.05
0.001	0.15
0.01	0.4
0.1	1.5
1	2.5
10	2.5

Technical drawings of a 90° CW optional tip leadform, showing dimensions and features:

- Top View:** Shows overall dimensions E (width), D (height), $L3$ (top flange height), $L4$ (bottom flange height), $b3$ (top flange width), $b2$ (2x) (bottom flange width), b (3x) (leadform width), and e (2x) (leadform offset). A feature control frame indicates a circular runout tolerance of $\Phi 0.25$ (M) on the leadform surface, with feature labels C, A, and B.
- Side View:** Shows dimensions A (leadform length), $c2$ (leadform thickness), and H (total height). A dashed circle indicates the location of the tip leadform, with a callout "SEE VIEW A".
- Front View:** Shows dimensions $E1$ (width), $E1/2$ (width offset), $D1$ (height), $L1$ (bottom flange height), and leadform positions 1, 2, and 3.
- VIEW A (OPTIONAL TIP LEADFORM (ROTATED 90° CW)):** A detailed view of the tip leadform, showing the **GAUGE PLANE**, **SEATING PLANE**, and dimensions C (leadform thickness), L (leadform length), $L2$ (leadform height), and $A1$ (leadform offset).

Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.086	0.090	0.094	2.18	2.28	2.38
A1	—	—	0.005	—	—	0.13
b	0.025	0.030	0.035	0.63	0.76	0.89
b2	0.028	0.037	0.045	0.72	0.93	1.14
b3	0.180	0.198	0.215	4.57	5.02	5.46
c	0.018	0.021	0.024	0.46	0.54	0.61
c2	0.018	0.021	0.024	0.46	0.54	0.61
D	0.235	0.240	0.245	5.97	6.10	6.22
D1	0.215	0.222	0.230	5.45	5.65	5.85
E	0.250	0.257	0.265	6.35	6.54	6.73
E1	0.202	0.210	0.218	5.14	5.34	5.54
e	—	0.090	—	—	2.29	—
H	0.370	0.390	0.410	9.40	9.91	10.41
L	0.055	0.063	0.070	1.40	1.59	1.78
L1	—	0.114	—	—	2.90	—
L2	—	0.020	—	—	0.51	—
L3	0.035	0.043	0.050	0.89	1.08	1.27
L4	—	0.020	0.040	—	0.51	1.01
L	—	—	10 deg.	—	—	10 deg.

