



XYD050N85

85V N-channel Shielding Gate MOSFET

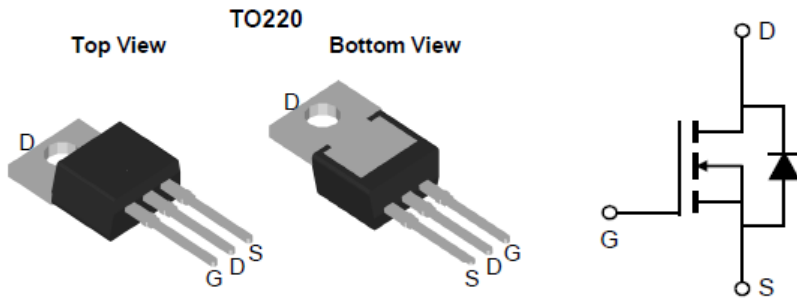
XYD050N85

Features

- N-channel, normal level
- Excellent Gate charge $\times R_{DS(on)}$ (FOM)
- Very low on-resistance $R_{DS(on)}$

This chip is used for:

- Industrial power supplies
- Boost converters
- Rectifier
- Telecom
- Industrial power supplies



Symbol	Parameter	Value	Units
V _{DS}	Drain-Source Voltage	85	V
I _D	Drain Current - Continuous (TC= 25°C)	140	A
	Drain Current - Continuous (TC= 100°C)	100	A
I _{DM}	Drain Current - Pulsed (Note 1)	360	A
V _{GS}	Gate-Source Voltage	± 20	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	176	mJ
P _D	Power Dissipation (TC = 25°C)	185	W
T _j , T _{stg}	Operating and Storage Temperature Range	-55 to +175	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	0.65	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	51	°C/W

Electrical Characteristics <small>TC = 25°C unless otherwise noted</small>						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	85			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 85\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$		3		V
$R_{DS(on)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 60\text{ A}$		4.7	5.0	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 60\text{ A}$ (Note 3)		90		S
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{GS}=0\text{V},$		3000		pF
C_{oss}	Output capacitance	$V_{DS}=40\text{V},$		660		pF
C_{rss}	Reverse transfer capacitance	$f=1\text{MHz}$		18		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DS} = 50\text{ V}, I_D = 60\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 4.7\ \Omega$ (Note 3, 4)		15		ns
t_r	Rising Time			29		ns
$t_{d(off)}$	Turn Off Delay Time			25		ns
t_f	Fall Time			18		ns
Q_g	Total Gate Charge	$V_{DS} = 40\text{ V}, I_D = 60\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3, 4)		37		nC
Q_{gs}	Gate-Source Charge			2.2		nC
Q_{gd}	Gate-Drain Charge			25		nC
R_g	Gate Resistance	$V_{DS} = 0\text{ V}, \text{Scan F mode}$		2.1		Ω
Drain-Source Diode Characteristics and Maximum Ratings						
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 130\text{ A}$			1.2	V
T_{rr}	Reverse recovery time	$I_S = 60\text{ A}, V_{GS} = 0\text{ V},$ $di_F/dt = 100\text{ A}/\mu\text{s}$		50		ns
Q_{rr}	Reverse recovery charge			57		nC
Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. $L = 0.5\text{ mH}, I_{AS} = 28\text{ A}, V_{DD} = 10\text{ V}, R_G = 25\ \Omega,$ Starting $T_j = 25^\circ\text{C}$ 3. $I_{SD} \leq 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS},$ Starting $T_j = 25^\circ\text{C}$ 4. Pulse Test : Pulse width $\leq 300\ \mu\text{s},$ Duty cycle $\leq 2\%$ 5. Essentially independent of operating temperature						

Typical Electronic and Thermal Characteristics

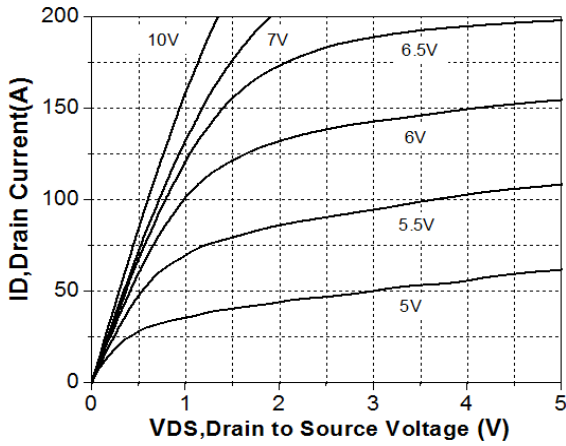


Figure 1. On-Region Characteristics

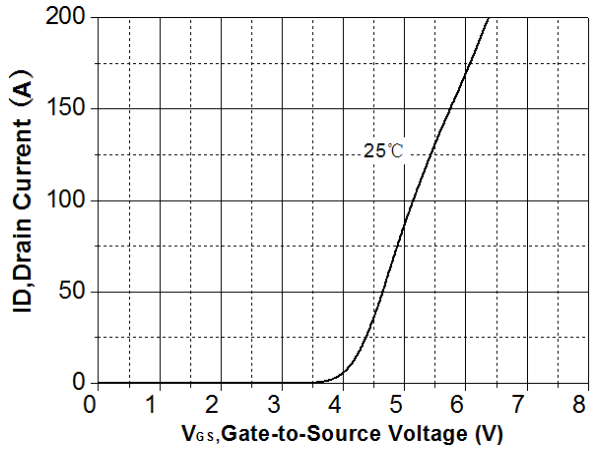


Figure 2. Transfer Characteristics

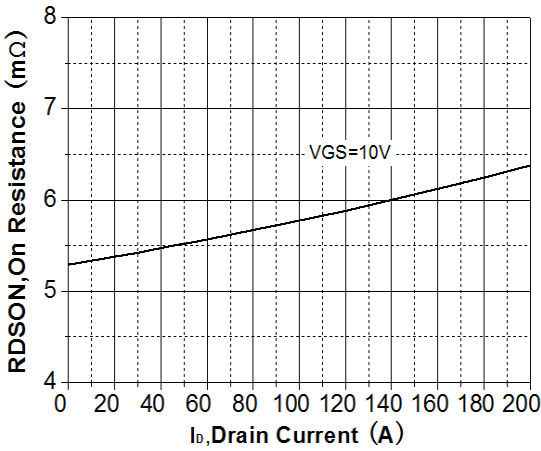


Figure 3. On-Resistance Variation vs Drain Current

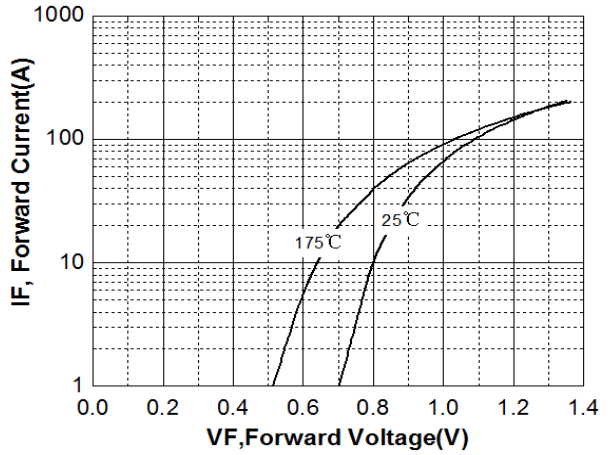


Figure 4. Body Diode Forward Voltage Vs Reverse Drain Current

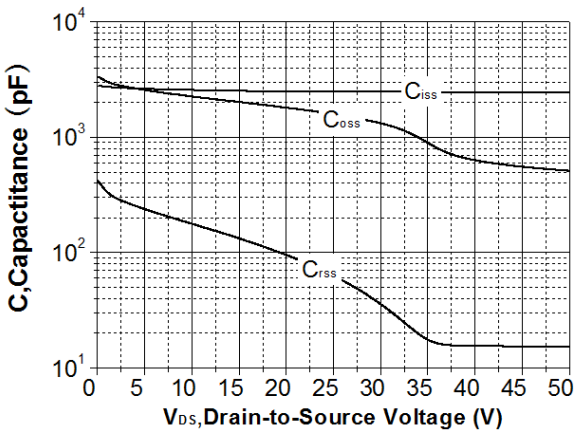


Figure 5. Capacitance Characteristics

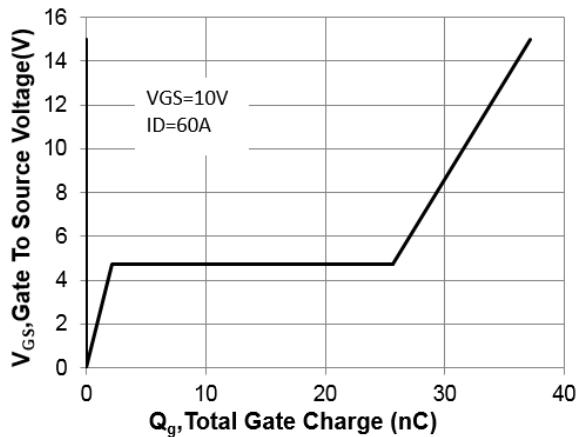


Figure 6. Gate Charge Characteristics

Typical Electronic and Thermal Characteristics

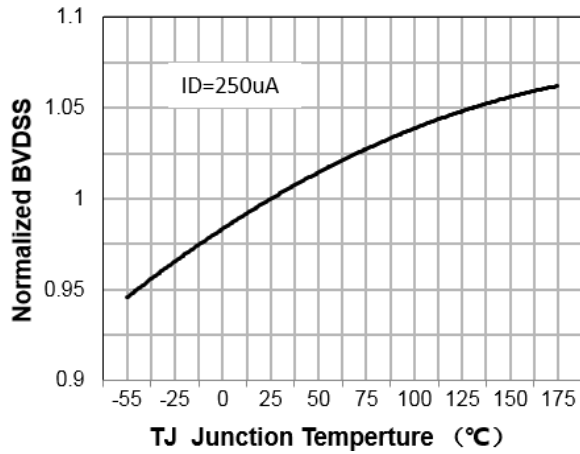


Figure 7. Breakdown Voltage Variation vs Temperature

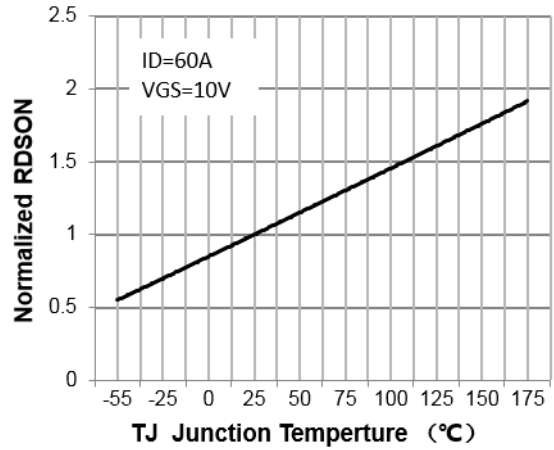


Figure 8. On-Resistance Variation vs Temperature

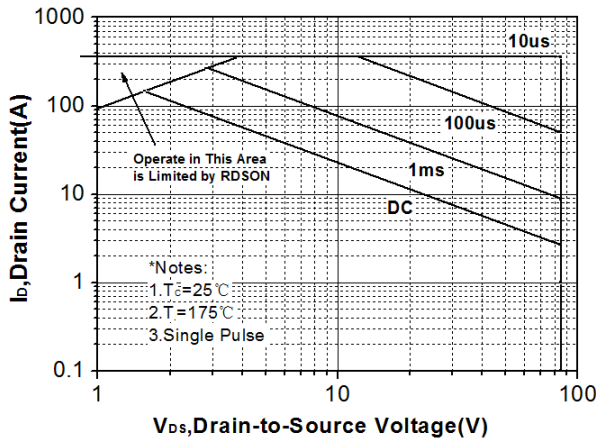


Figure 9. Maximum Safe Operating Area

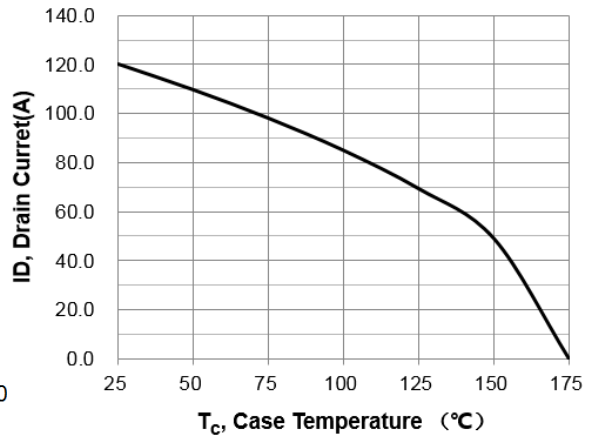


Figure 10. Maximum Drain Current vs Case Temperature

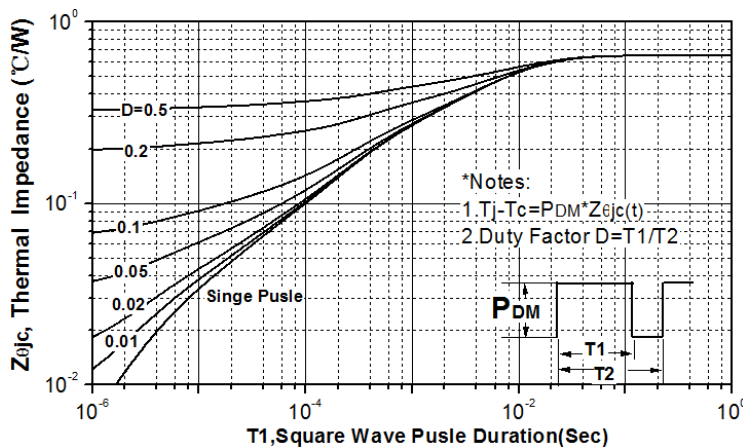
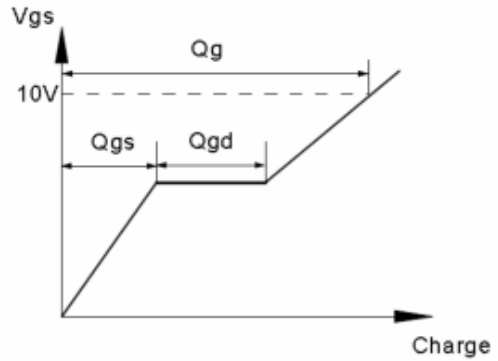
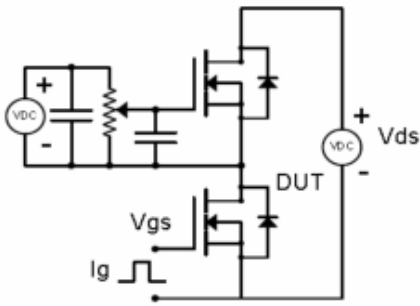


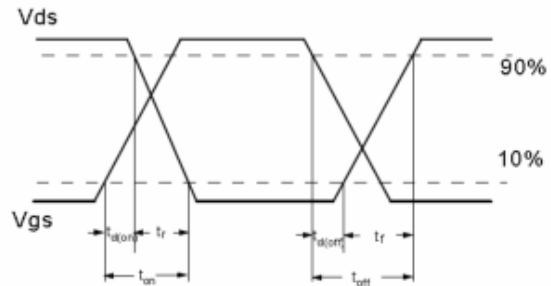
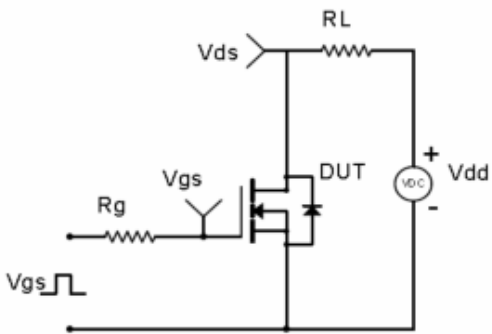
Figure 11. Transient Thermal Response Curve

Test Circuit & Waveform

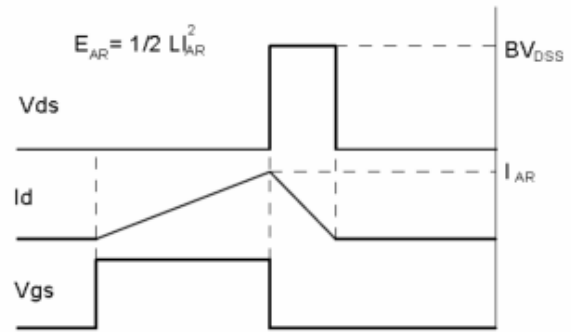
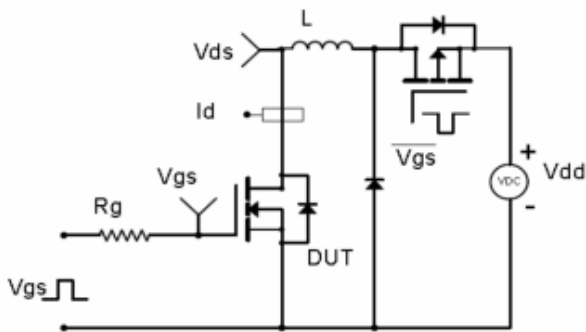
Gate Charge Test Circuit & Waveform



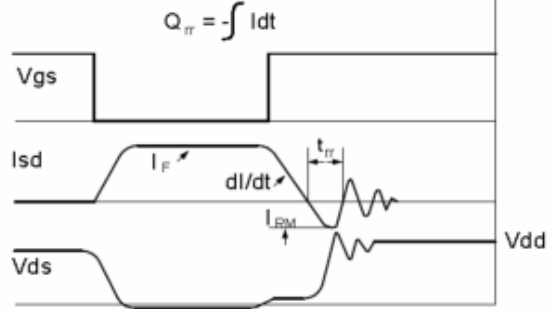
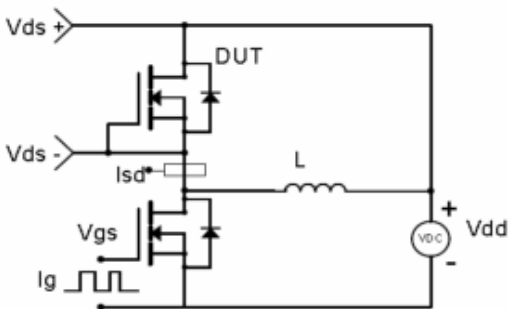
Resistive Switching Test Circuit & Waveforms



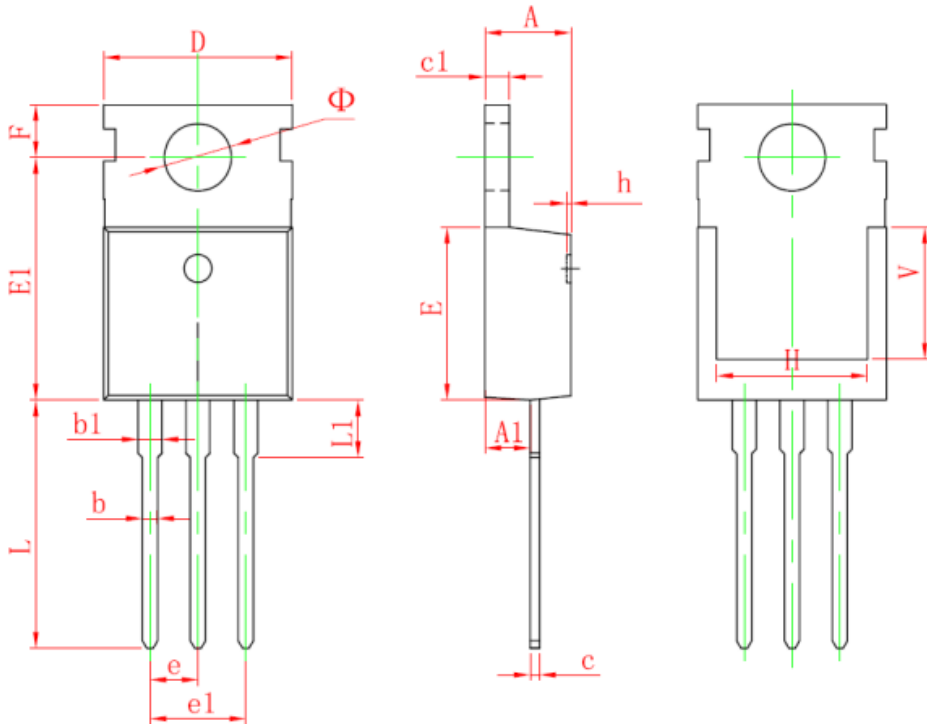
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Dimensions : TO-220-3L(T0.5mm) PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150