

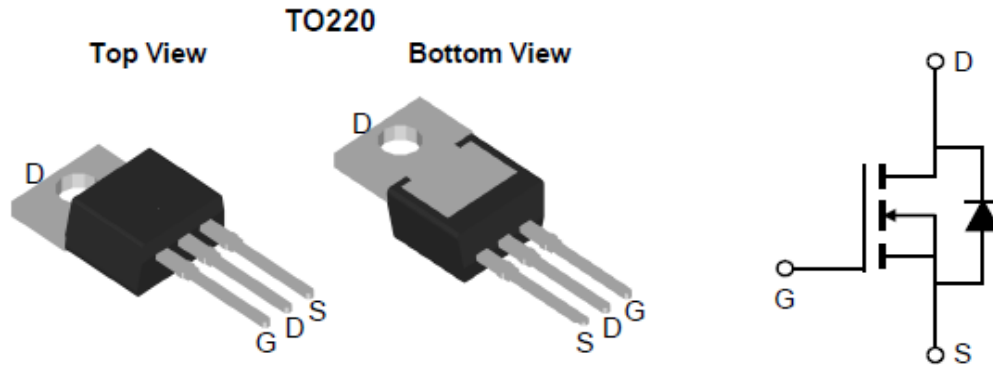
XYD040N90

Feature:

- 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



Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	90	V
Continuous drain current $T_C = 25^\circ\text{C}$ (limit by package)	I_D	150	A
Pulsed drain current $T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}	$I_{D\text{ puls}}$	280	
Avalanche energy, single pulse (L=0.5Mh)	E_{AS}	156	mJ
Gate-emitter voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	205	W
Operating junction and storage temperature	T_j, T_{stg}	-55 to +175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case	R_{thJC}	0.62	$^\circ\text{C}/\text{W}$
Thermal resistance, junction – ambient, Max	R_{thJA}	58.0	

Electrical Characteristic, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V,$ $I_D=250\mu A$	90			V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS},$ $I_D=250\mu A$ $T_j=25^\circ C$	2	3	4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=85V, V_{GS}=0V$ $T_j=25^\circ C$			1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$			100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=70A,$ $T_j=25^\circ C$ TO220		3.8	4.0	m Ω
Gate resistance	R_G			2		Ω
Transconductance	g_{fs}	$V_{DS}=10V, I_D=70A$		128		S
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=140A$			1.2	V
Input capacitance	C_{iss}	$V_{GS}=0V,$ $V_{DS}=40V,$ $f=1MHz$		3300		pF
Output capacitance	C_{oss}			819		
Reverse transfer capacitance	C_{res}			9		
Gate charge	Q_G	$V_{GS}=10V,$ $V_{DS}=40V,$ $I_D=70A$		48.5		nC
	Q_{gs}			2		
	Q_{gd}			32		

Switching Characteristic, resistive Load, at $T_j=25^\circ C$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
MOSFET Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C,$ $V_{GS}=10V,$ $V_{DS}=40V,$ $I_D=70A$ $R_G=4.7\Omega$		18		nS
Rise time	t_r			32		
Turn-off delay time	$t_{d(off)}$			37		
Fall time	t_f			18		
Body Diode Reverse Recovery Time	t_{rr}	$TJ = 25^\circ C, IF = 1S$ $di/dt = 100A/\mu s$		52		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$TJ = 25^\circ C, IF = 70A$ $di/dt = 100A/\mu s$		68		nC

Typical Electrical and Thermal Characteristics

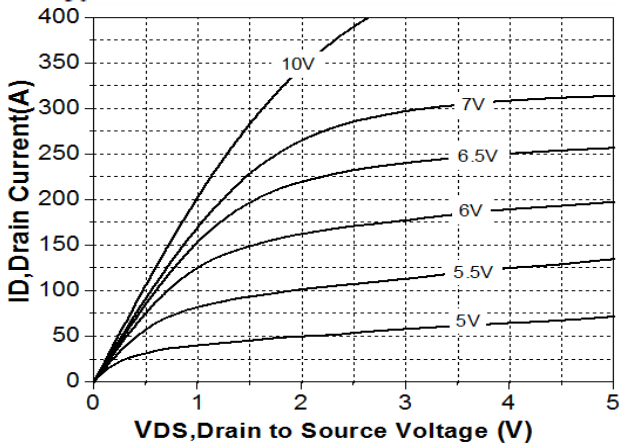


Figure 1 Output Characteristics

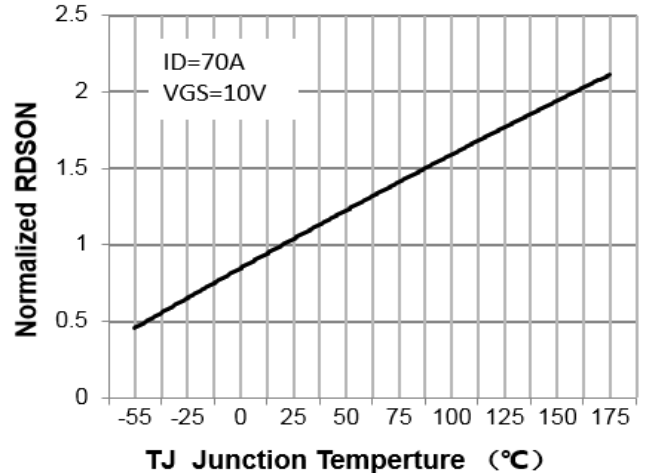


Figure 4 Rdson-Junction Temperature

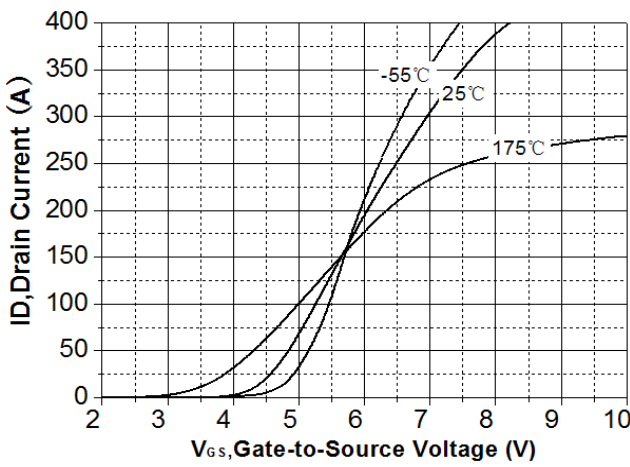


Figure 2 Transfer Characteristics

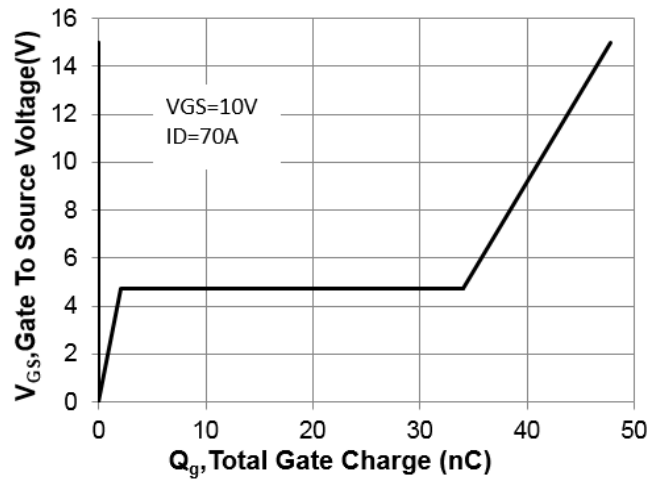


Figure 5 Gate Charge

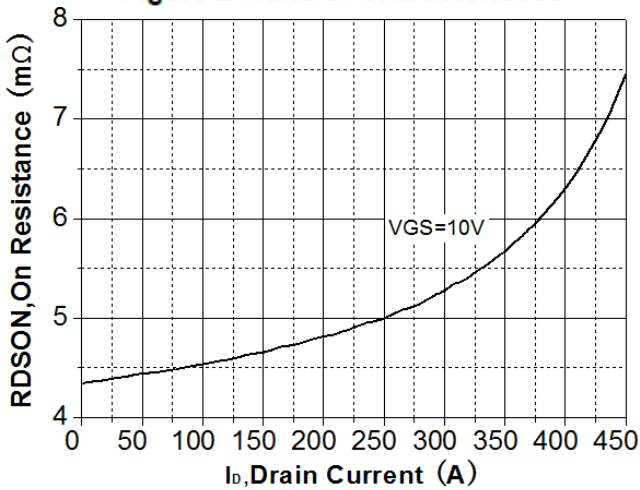


Figure 3 Rdson- Drain Current

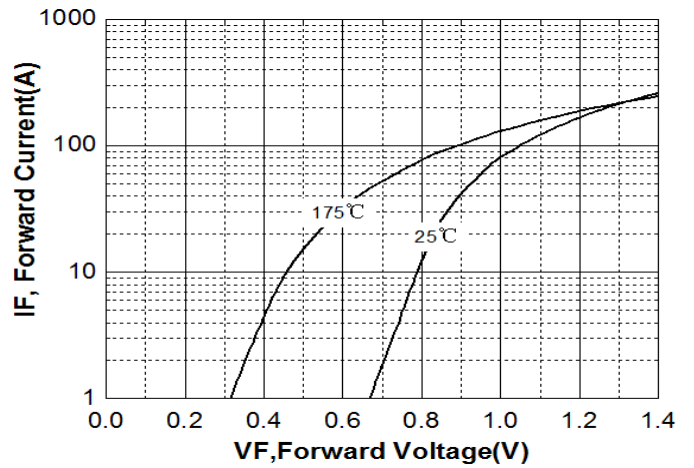


Figure 6 Source- Drain Diode Forward

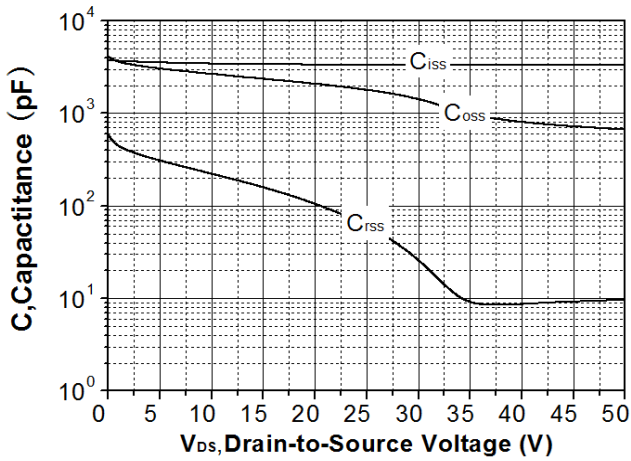


Figure 7 Capacitance vs Vds

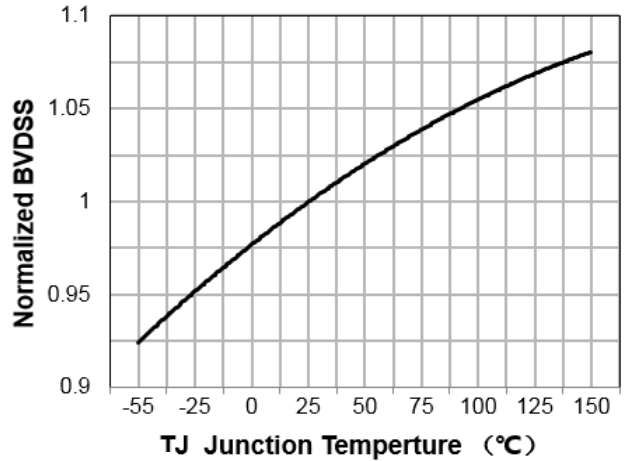
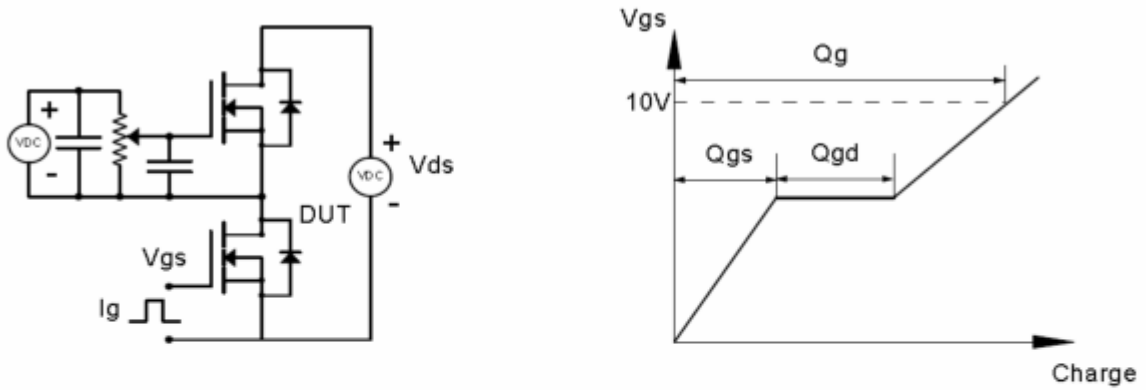


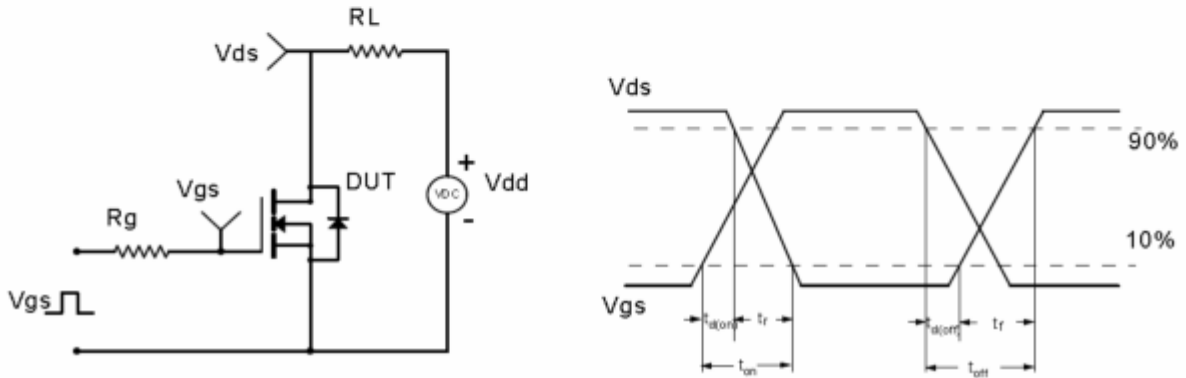
Figure 8 BVDSS vs Junction Temperature

Test Circuit & Waveform

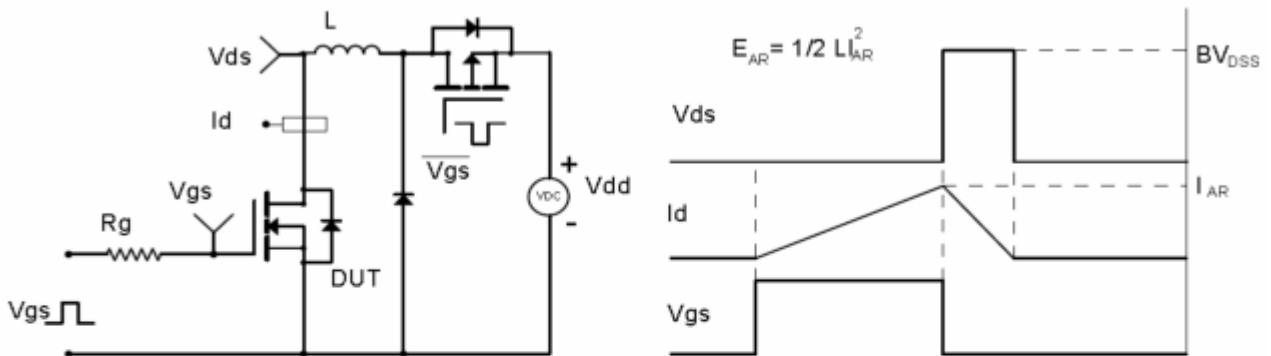
Gate Charge Test Circuit & Waveform



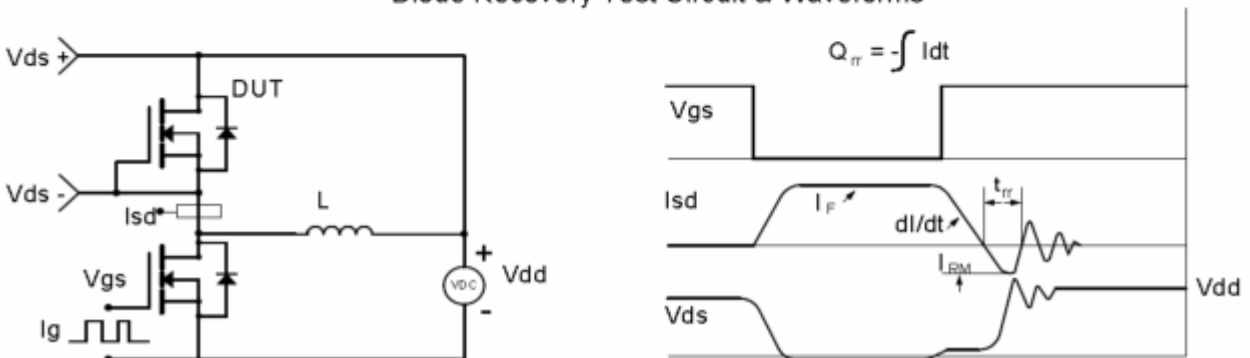
Resistive Switching Test Circuit & Waveforms



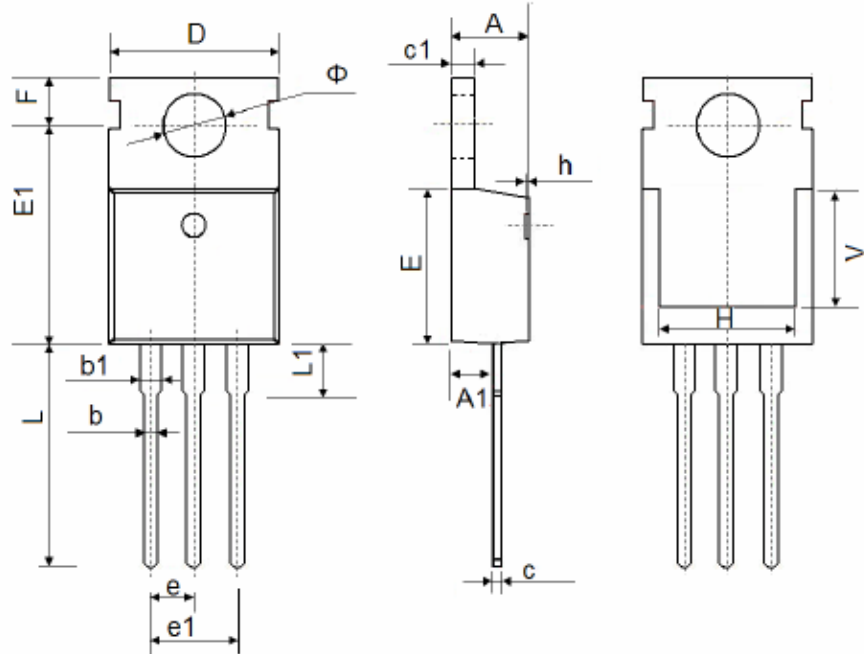
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



TO-220-3L Package Information



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	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
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	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150