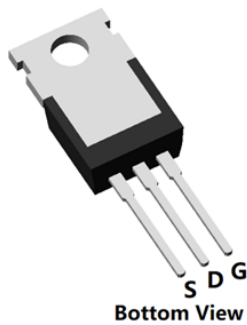
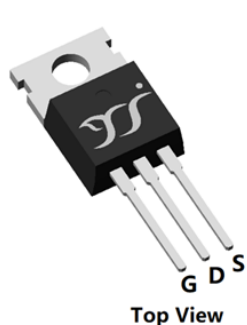
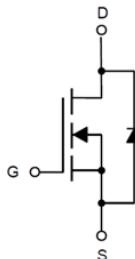


N-Channel Enhancement Mode Field Effect Transistor



TO-220



Product Summary

• V_{DS}	600V
• I_D	52A
• $R_{DS(ON)}$ (at $V_{GS}=10V$)	<48m Ω
• 100% EAS Tested	
• 100% ∇V_{DS} Tested	
• ESD Level(HBM)	H3A

General Description

- Super Junction High Voltage MOSFET technology
- Intrinsic fast-recovery body diode
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Microinverter

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage			V _{DS}	-	600	V
Gate-source Voltage			V _{GS}	-30	30	
Continuous Drain Current (Note 1,2)	Steady-State	T _A =25°C,V _{GS} =10V	I _D	-	5.7	A
		T _A =100°C,V _{GS} =10V		-	3.6	
Continuous Drain Current (Note 1,3)	Steady-State	T _C =25°C,V _{GS} =10V		-	52	
		T _C =100°C,V _{GS} =10V		-	32.8	
Pulsed Drain Current	T _C =25°C,t _p ≤10μs		I _{DM}	-	208	
Maximum Body-Diode Continuous Current	T _C =25°C		I _S		52	
Maximum Body-Diode Pulsed Current	T _C =25°C,t _p ≤10μs		I _{SM}	-	208	
Avalanche Energy (non-repetitive)	T _J =25°C,V _G =10V,R _G =25Ω,L=30mH,I _{AS} =7A		EAS	-	735	mJ
Total Power Dissipation (Note 1,2)	Steady-State	T _A =25°C	P _D	-	3.67	W
		T _A =100°C		-	1.47	
Total Power Dissipation (Note 1,3)	Steady-State	T _C =25°C		-	304.8	
		T _C =100°C		-	121.9	
MOSFET dv/dt Ruggedness	V _{DS} =0...300V, I _D <=20A,R _g =0Ω		dv/dt	-	105	V/ns
Reverse Diode dv/dt	V _{DS} =0...300V,I _D <=20A,d _i /dt=100A/us		dv/dt	-	43.2	
Maximum Diode Commutation Speed	V _{DS} =0...300V,I _D <=20A,R _g =0Ω		dif/dt	-	3600	A/us
Junction and Storage Temperature Range			T _J ,T _{STG}	-55	150	°C

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	34	$^{\circ}C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	0.41	



YJP048C60DF

■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =1mA, T _j =25℃	600	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V, T _j =25℃	-	-	1	μA
		V _{DS} =600V, V _{GS} =0V, T _j =125℃	-	-	100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V, T _j =25℃	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA, T _j =25℃	3	4	5	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A, T _j =25℃	-	40	48	mΩ
		V _{GS} =10V, I _D =20A, T _j =150℃	-	92.5	111	
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V, T _j =25℃	-	0.94	1.2	V
Gate Resistance	R _G	f=1MHz, T _j =25℃	-	6	-	Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =300V, V _{GS} =0V, f=1MHz, T _j =25℃	-	3840	-	pF
Output Capacitance	C _{oss}		-	78	-	
Reverse Transfer Capacitance	C _{rss}		-	9	-	
Effective Output capacitance, Energy Related	C _{o(er)}	V _{DS} =0...300V, V _{GS} =0V, f=1MHz, T _j =25℃	-	212	-	
Effective Output Capacitance, Time Related	C _{o(tr)}		-	1693	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =300V, I _D =20A, T _j =25℃	-	100.3	-	nC
Gate-Source Charge	Q _{gs}		-	24.3	-	
Gate-Drain Charge	Q _{gd}		-	47.9	-	
Reverse Recovery Charge	Q _{rr}	I _F =20A, di/dt=100A/μs, V _{GS} =0V, V _R =300V, T _j =25℃	-	829.3	-	nC
Reverse Recovery Time	t _{rr}		-	132.2	-	ns
Peak Reverse Recovery Current	I _{rrm}		-	10.4	-	A
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DS} =300V, I _D =20A, R _{GEN} =3Ω, T _j =25℃	-	142.1	-	ns
Turn-on Rise Time	t _r		-	35.7	-	
Turn-off Delay Time	t _{D(off)}		-	104.6	-	
Turn-off Fall Time	t _f		-	17.1	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^{\circ}C$. The maximum allowed junction temperature of 150 $^{\circ}C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).

■ Typical Electrical and Thermal Characteristics Diagrams

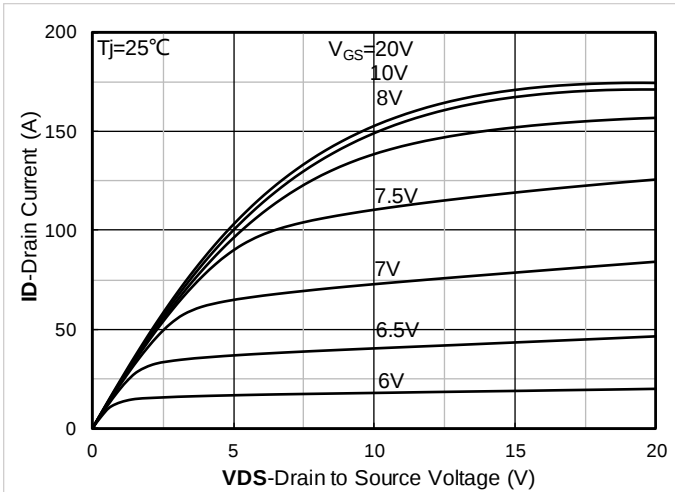


Figure 1. Output Characteristics; typical values

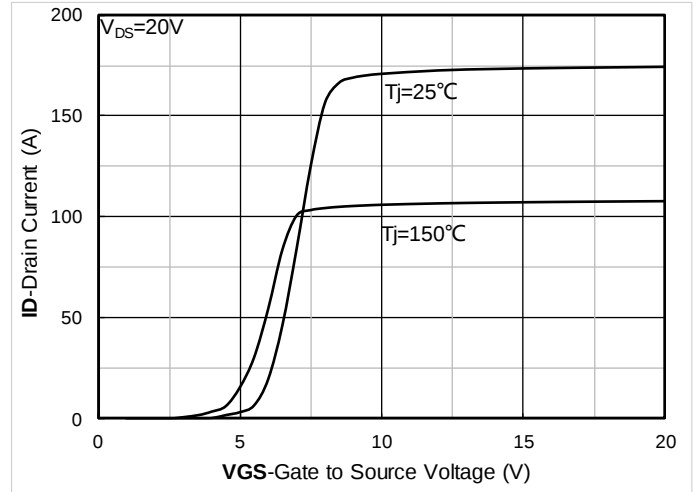


Figure 2. Transfer Characteristics; typical values

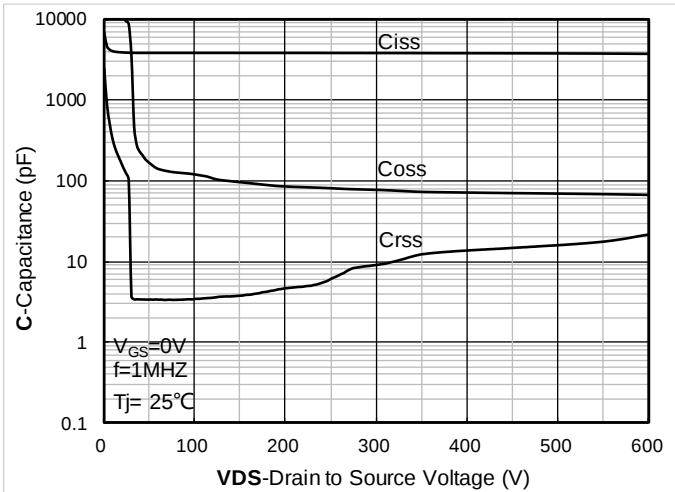


Figure 3. Capacitance Characteristics; typical values

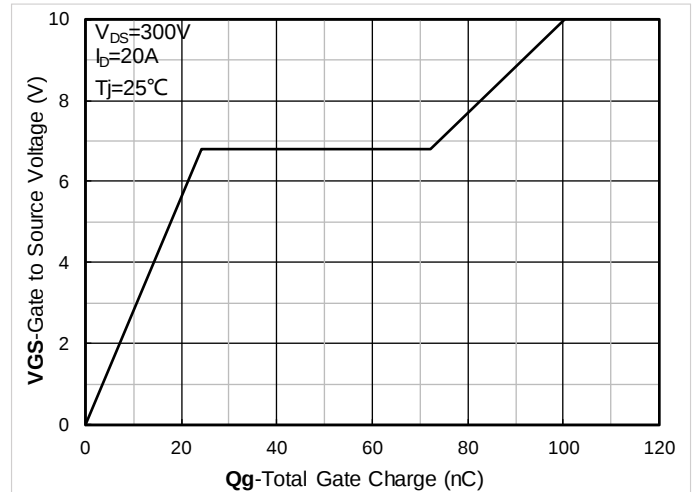


Figure 4. Gate Charge; typical values

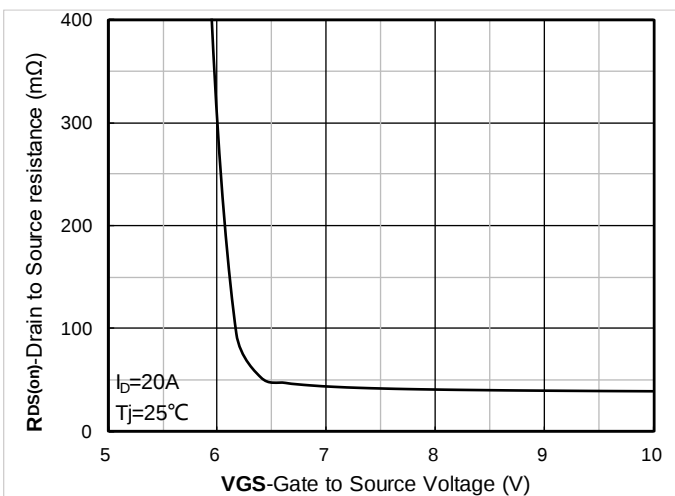


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

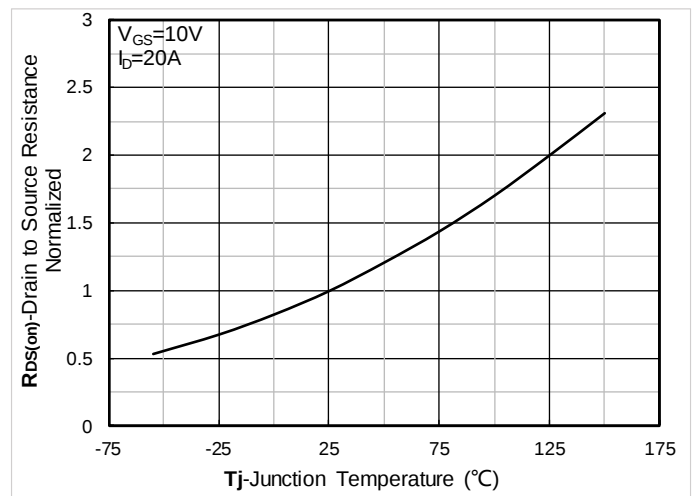


Figure 6. Normalized On-Resistance

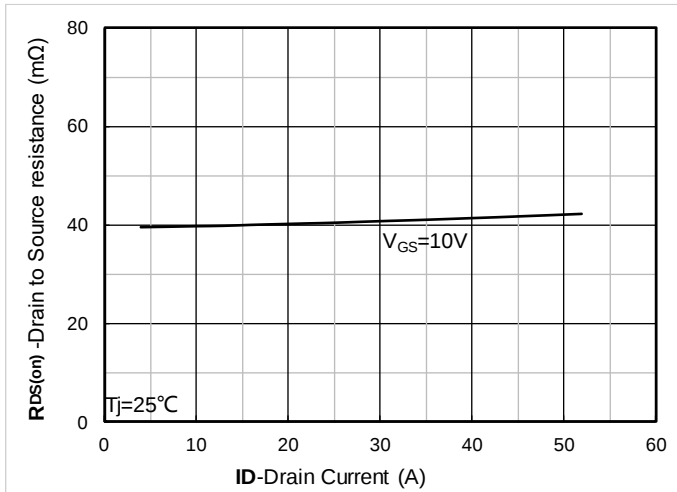


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

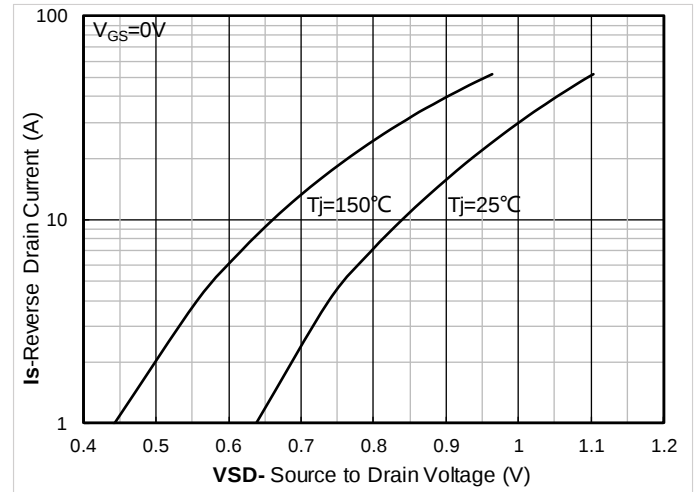


Figure 8. Forward characteristics of reverse diode; typical values

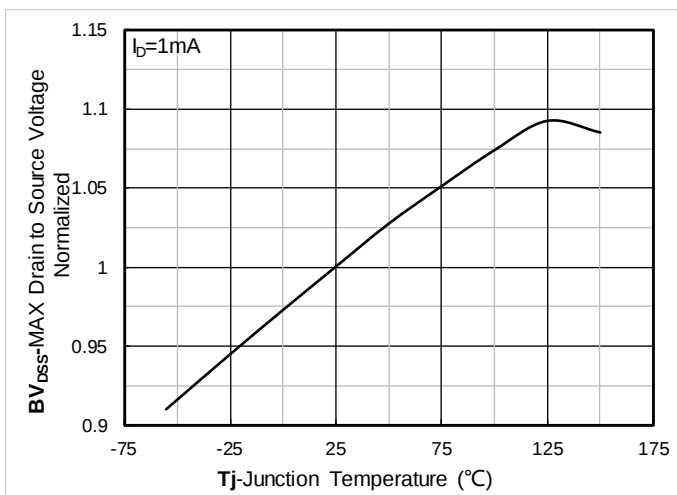


Figure 9. Normalized breakdown voltage

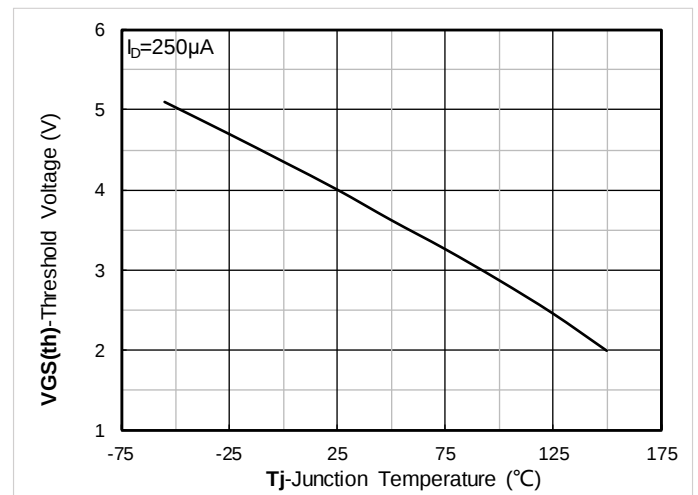


Figure 10. Gate Threshold voltage; typical values

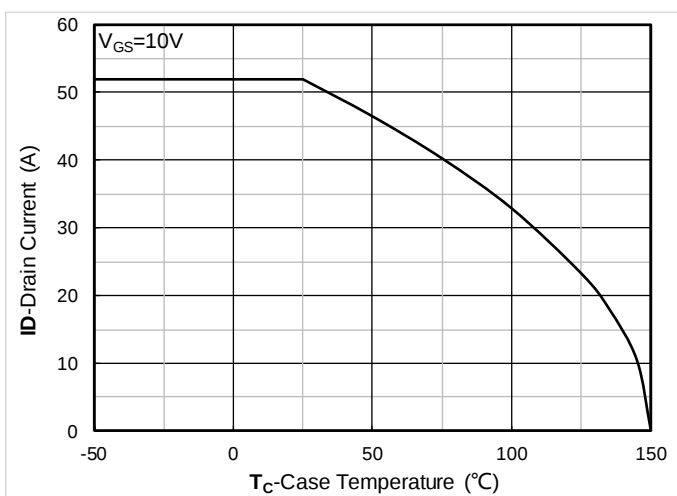


Figure 11. Current dissipation

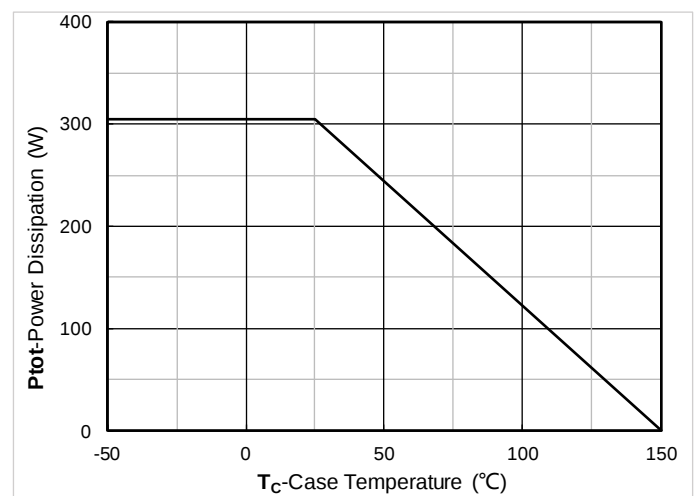


Figure 12. Power dissipation

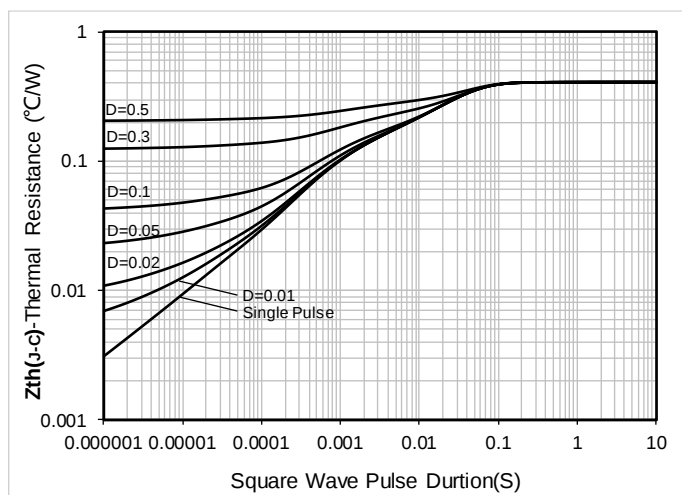


Figure 13. Maximum Transient Thermal Impedance

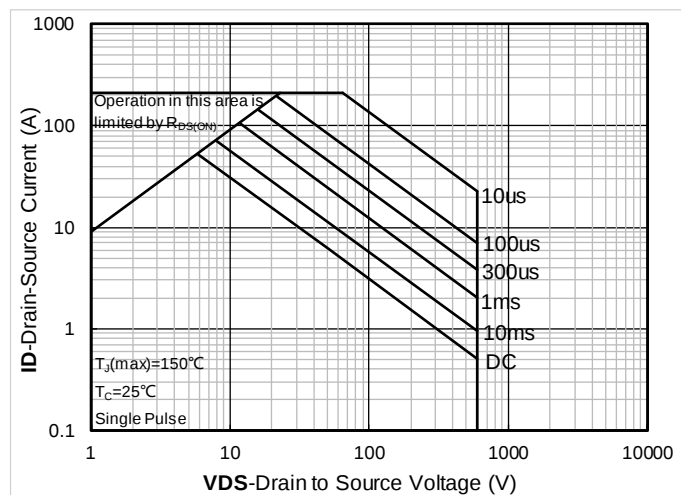


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

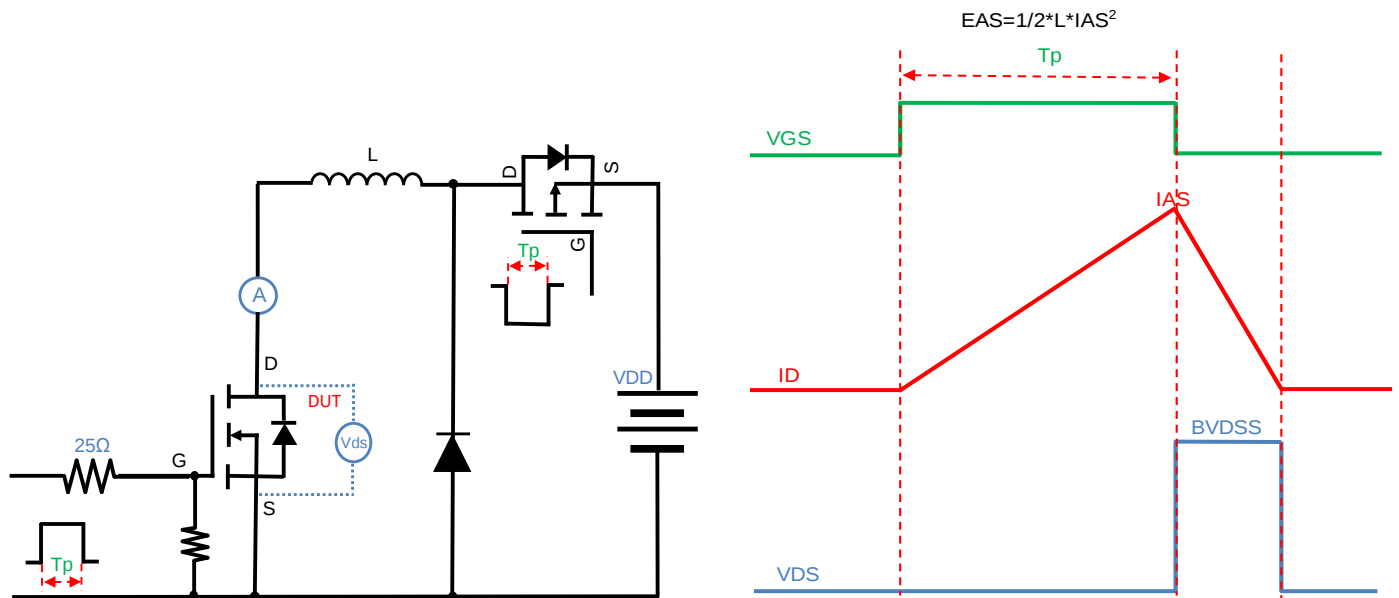


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

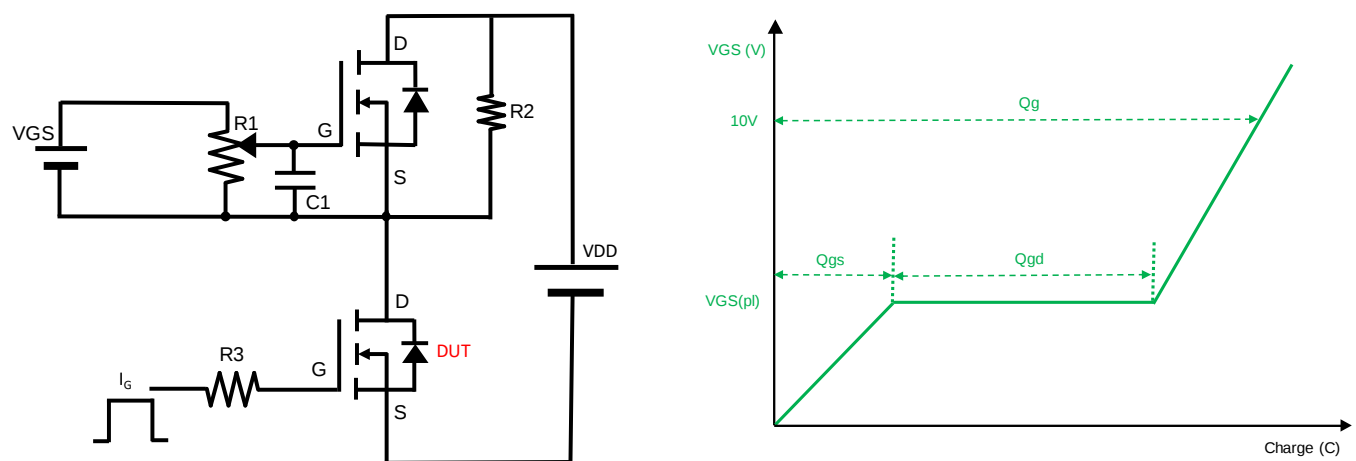


Figure B. Gate Charge Test Circuit & Waveform

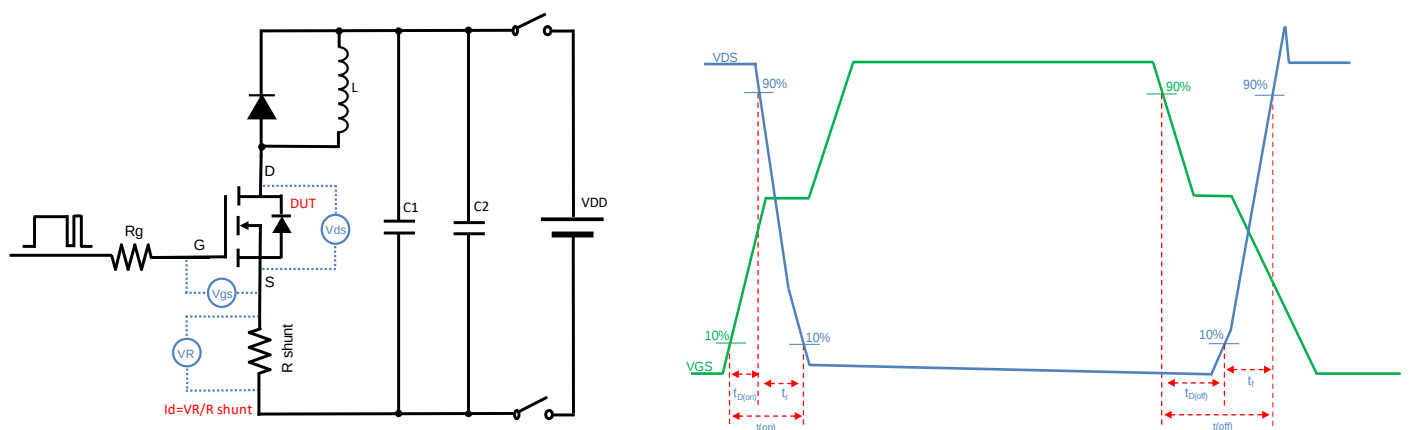


Figure C. Resistive Switching Test Circuit & Waveform

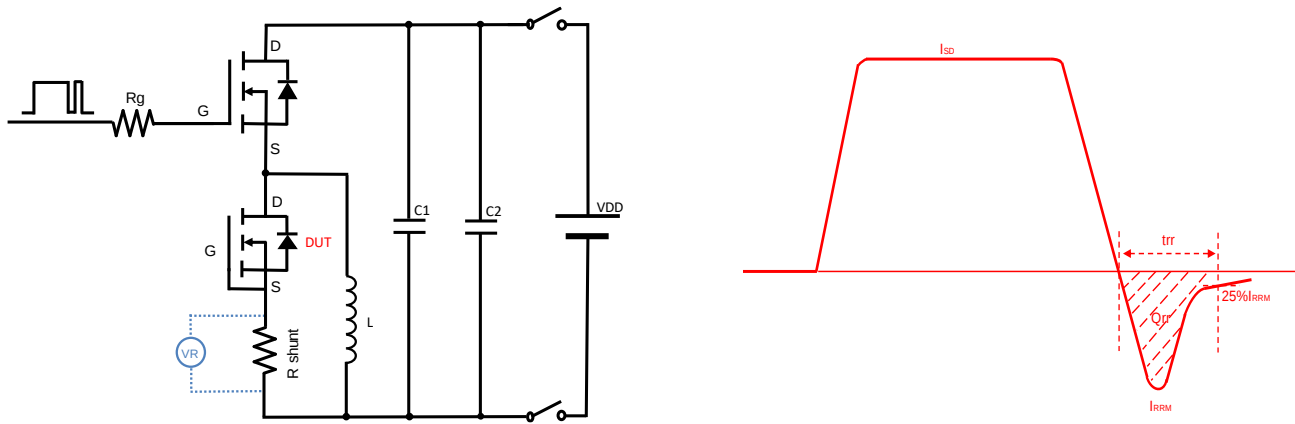
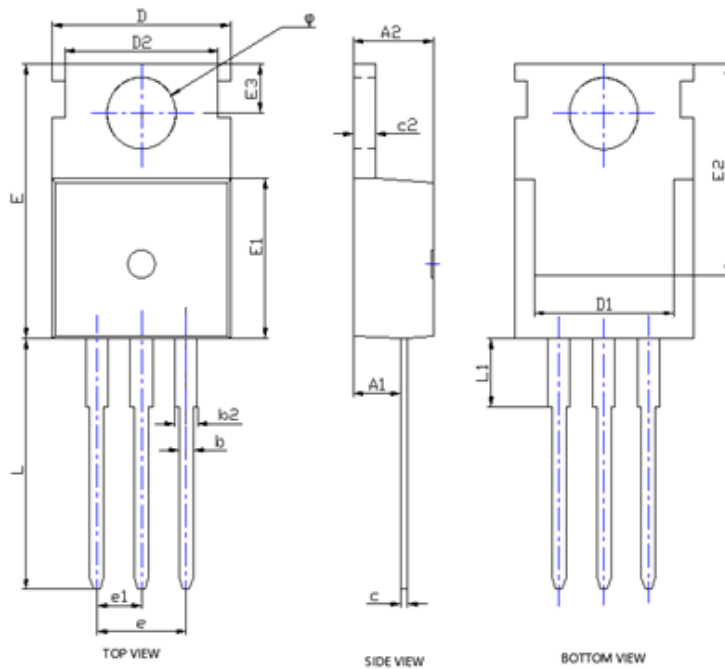


Figure D. Diode Recovery Test Circuit & Waveform

■ TO-220AB-C Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.173	0.181	4.400	4.600
b	0.028	0.035	0.700	0.900
b2	0.049	0.056	1.250	1.420
c	0.018	0.022	0.450	0.550
c2	0.049	0.053	1.250	1.350
D	0.392	0.402	9.700	10.200
D1	0.295	0.331	7.500	8.400
D2	0.335	0.350	8.500	8.900
E	0.602	0.634	15.300	16.100
E1	0.358	0.366	9.100	9.300
E2	0.497	0.525	12.630	13.330
E3	0.108BSC		2.750BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.512	0.531	13.000	13.500
L1	---	0.138	---	3.500
φ	0.140	0.148	3.550	3.750

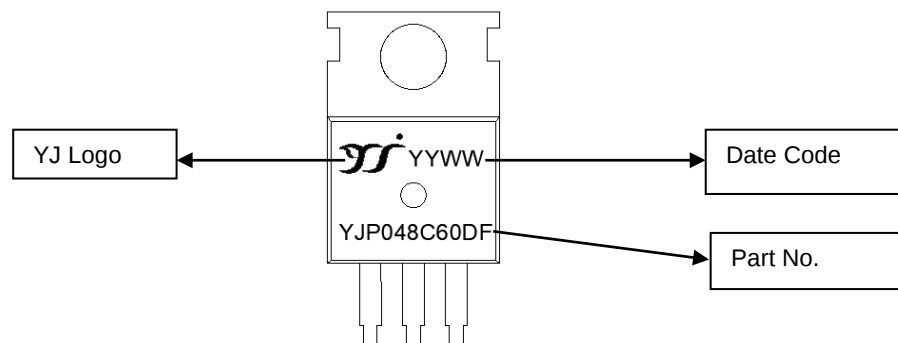
NOTE:

- 1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
- 2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.



YJP048C60DF

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJP048C60DF is marking code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



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