

N-Channel Super Junction Power MOSFET

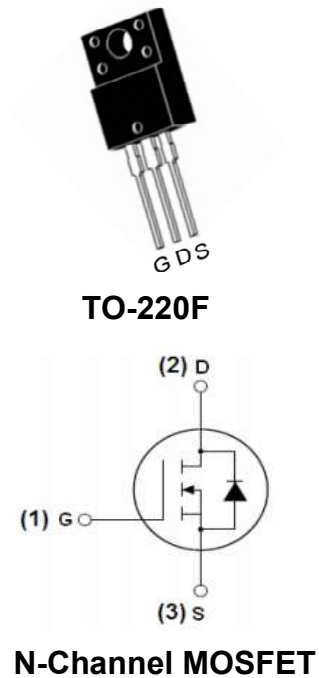
Features

- * $V_{DS}=500V$, $I_D = 15A$
 $R_{DS(ON)} = 480m\Omega$ (type.) @ $V_{GS} = 10V$
- * Low On-resistance and low Conduction losse
- * Excellent Switching Characteristics
- * Good Stability and uniformity with high EAs
- * Ultra Low Gate Charge: $Q_g=45nC$ (Typ.)
- * Lead Free Available(RoHS Compliant)
- * TO-220F Package for good heat dissipation

Applications

- * Power factor Correction (PFC)
- * Switched Mode Power Supplies (SMPS)
- * Uninterruptible power supply (UPS)

Pin Description and Schematic



Package Marking And Ordering Information

Device	Marking	Device Package	Quantity
SWRG15N50FT2FBP	G15N50F	TO-220F	1000pcs, Tape&Reel

ABSOLUTE MAXIMUM RATINGS (T_c = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	SWRG15N50F	Unit
Drain - Source Voltage (V _{GS} =0V)		V _{DS}	500	V
Gate - Source Voltage (V _{DS} =0V), AC(f > 1Hz)		V _{GS}	±30	V
Coutinuous Drain Current	TJ=25'C	ID	15	A
	TJ=100'C		7.9	
Pulsed Drain Current		IDM	60	A
Maximum Power Dissipation		PD	48	W
Derate above 25'C			0.26	W / 'C
Single Pulsed Avalanche Energy ^{note1}		EAS	810	mJ
Avalanche Current ^{note2}		IAR	13	A
Operating Junction and Storage Temperature Range		TJ, Tstg	-55 to 150	'C
Thermal Resistance, Junction-to-Case(Maximum)		RQJC	2.23	'C/W
Thermal Resistance, Junction-to-Ambient(Maximum)		RQJA	62.5	'C/W

Note 1. L=17.1mH, I_{AS}=15A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C

2. Repetitive Rating: Pulse width limited by maximum junction temperature

Electrical Characteristics (TA = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	SWRG15N50F			Unit
			Min	Typ	Max	
On/Off States						
Drain -Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250uA	500	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D = 250uA, Refer to 25°C	-	0.48	-	V/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V, T _C =25°C	-	0.05	1.0	uA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =400V, V _{GS} =0V, T _C =125°C	-	-	100	uA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} = ±30V	-	-	±100	nA
Gate-Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250uA	2.0	3.0	4.0	V
Drain-Source-On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 7.5A	-	-	480	mΩ
Dynamic Characteristics						
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V F=1MHz	-	1800	2300	pF
Onput Capacitance	C _{OSS}		-	245	320	
Reverse Transfer Capacitance	C _{RSS}		-	25	35	
Switching Characteristics						
Total Gate Charge	Q _g	V _{DS} = 400V, V _{GS} = 10V I _D = 15A(Note3,4)	-	45	60	nC
Gate-Source Charge	Q _{gs}		-	11	-	
Gate-Drain Charge	Q _{gd}		-	22	-	
Turn-On Delay Time	t _{d(ON)}	V _{DD} =250V,I _D =15A, R _G =25Ω V _{GS} = 10V(Note3,4)	-	40	90	ns
Rise Time	t _r		-	140	290	
Turn-Off Delay Time	t _{d(OFF)}		-	100	210	
Fall Time	t _f		-	85	180	
Drain-Source Diode Characteristics						
Source-Drain Current(Body Diode)	I _{SD}	T _C =25°C	-	-	15	A
Pulsed Source-Drain Current(Body Diode)	I _{SDM}		-	-	60	A
Forward on Voltage	V _{SD}	T _J =25°C, V _{GS} =0V, I _{SD} =15A	-	-	1.5	V
Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =15A	-	290	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt=100A/us	-	2.6	-	uC

Note 3. Pulse Test: Pluse Width ≤ 300us, Duty Cycle ≤2%

4. Essentially Independent of Operating Temperature

Typical Characteristics (T_J = 25°C unless otherwise noted)

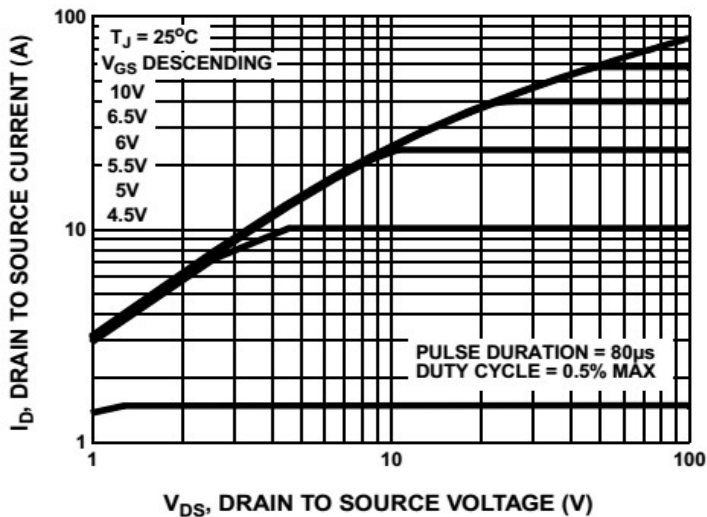


Figure 1. Output Characteristics

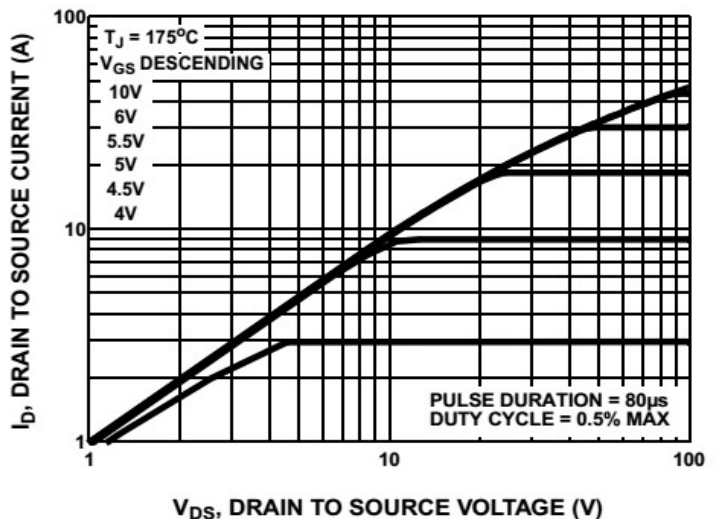


Figure 2. Output Characteristics

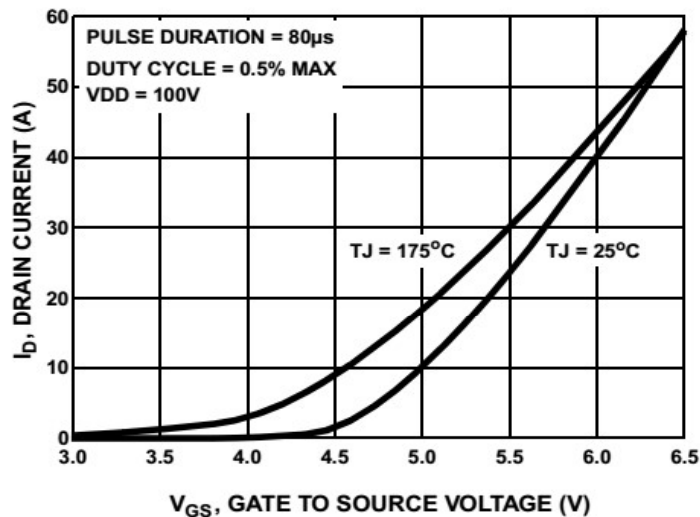


Figure 3. Transfer Characteristics

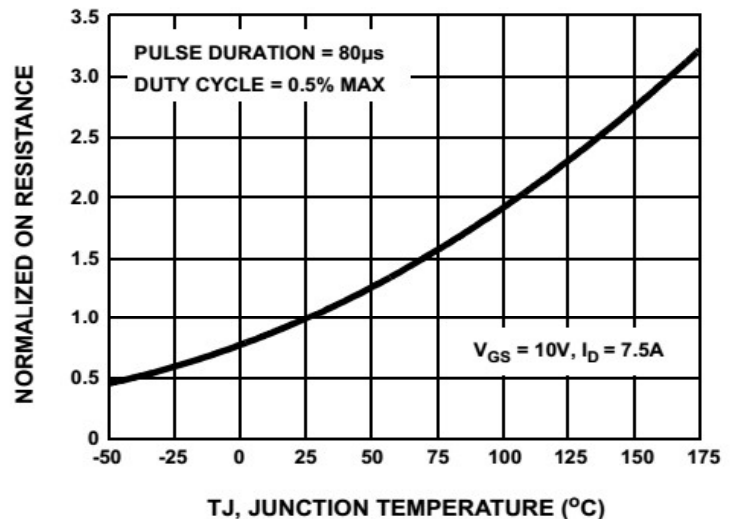


Figure 4. Normalized Drain To Source On Resistance vs Junction Temperature

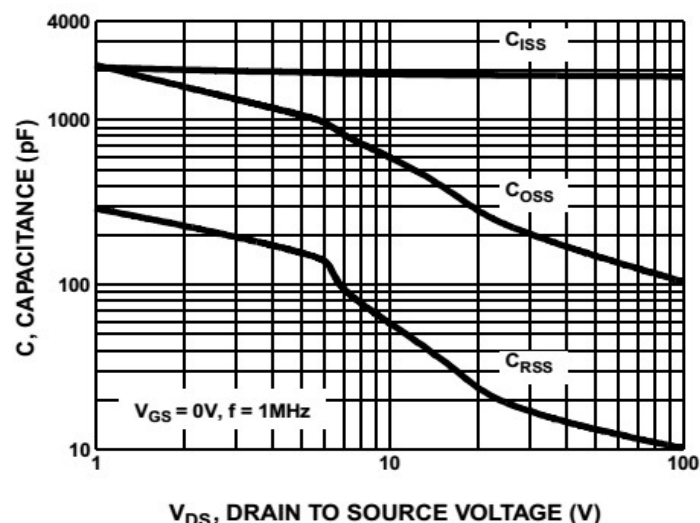


Figure 5. Capacitance vs Drain To Source Voltage

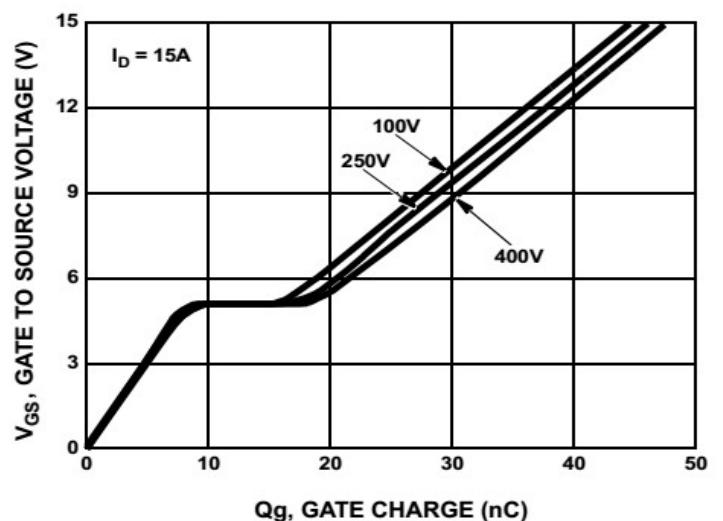


Figure 6. Gate Charge Waveforms For Constant Gate Current

Typical Characteristics (Con.)

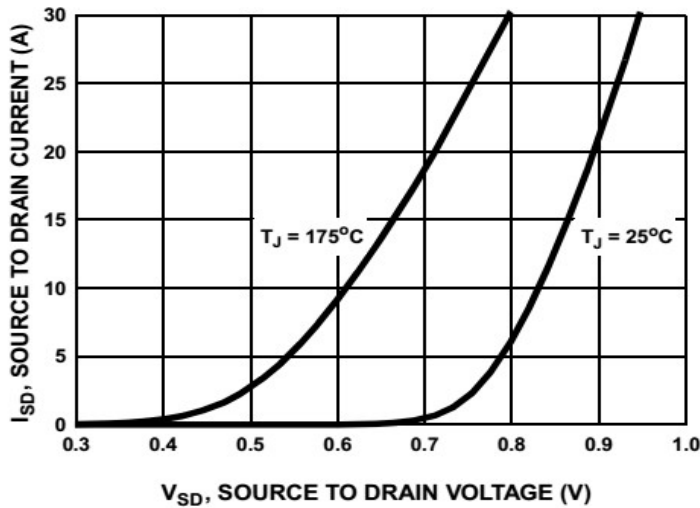


Figure 7. Body Diode Forward Voltage vs Body Diode Current

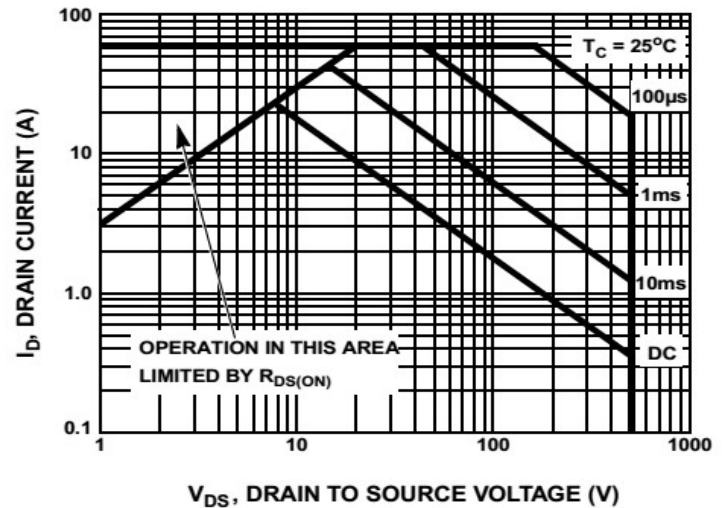


Figure 8. Maximum Safe Operating Area

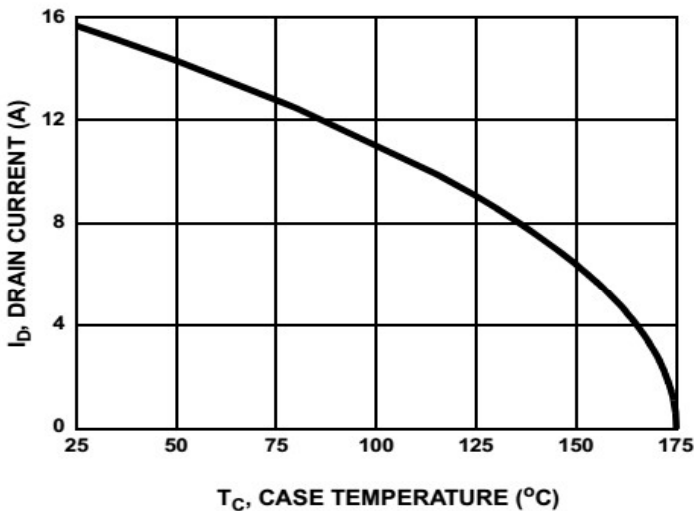


Figure 9. Maximum Drain Current vs Case Temperature

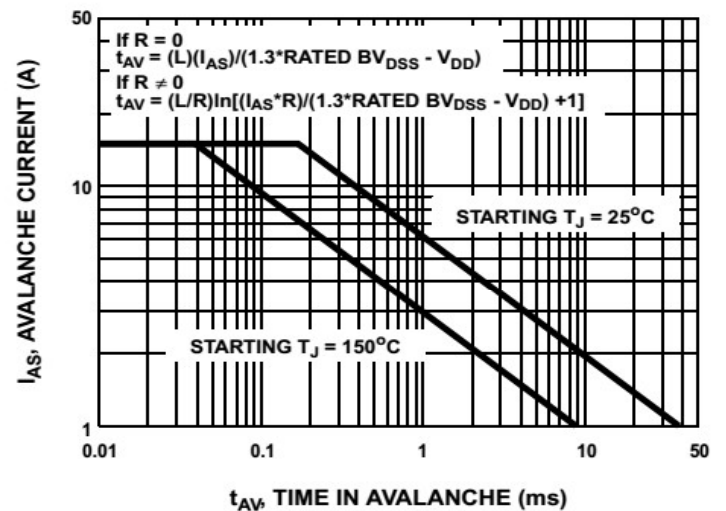


Figure 10. Unclamped Inductive Switching Capability

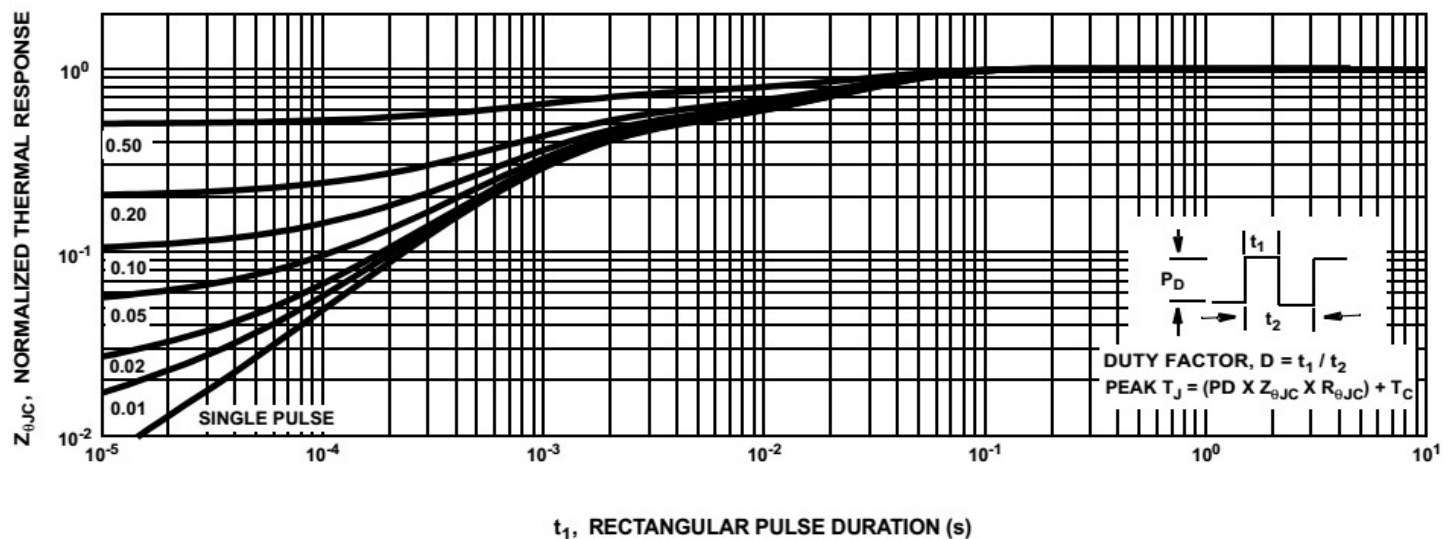


Figure 11. Normalized Transient Thermal Impedance, Junction to Case

Test Circuits and Waveforms

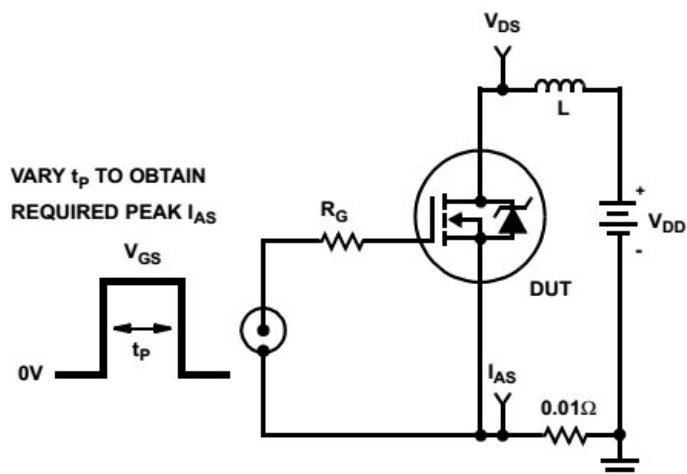


Figure 12. Unclamped Energy Test Circuit

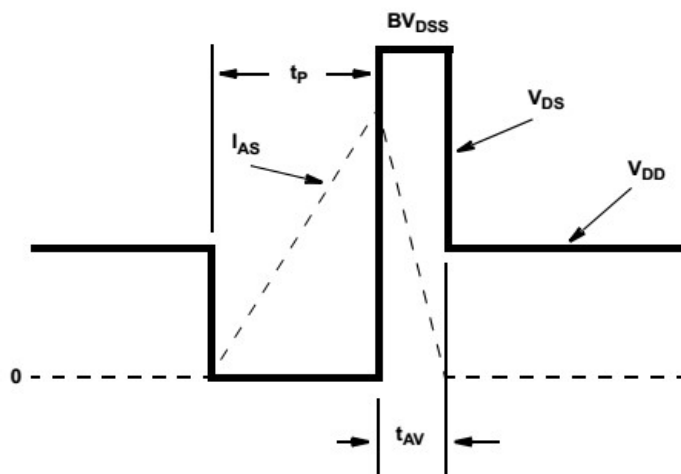


Figure 13. Unclamped Energy Waveforms

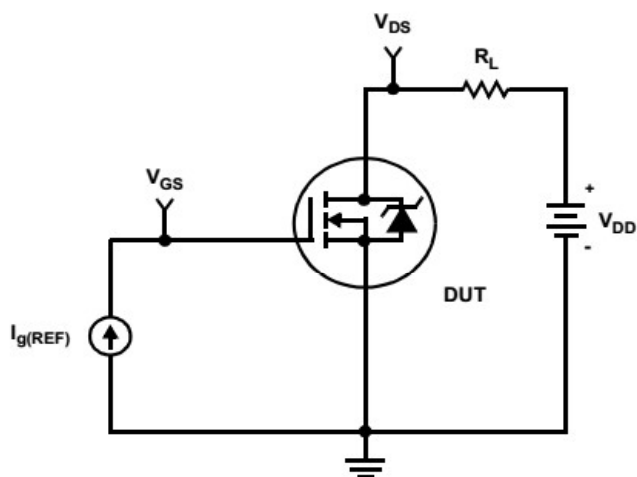


Figure 14. Gate Charge Test Circuit

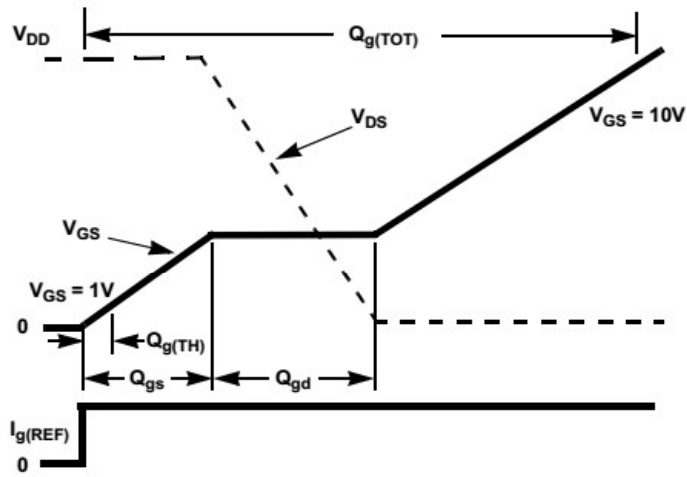


Figure 15. Gate Charge Waveforms

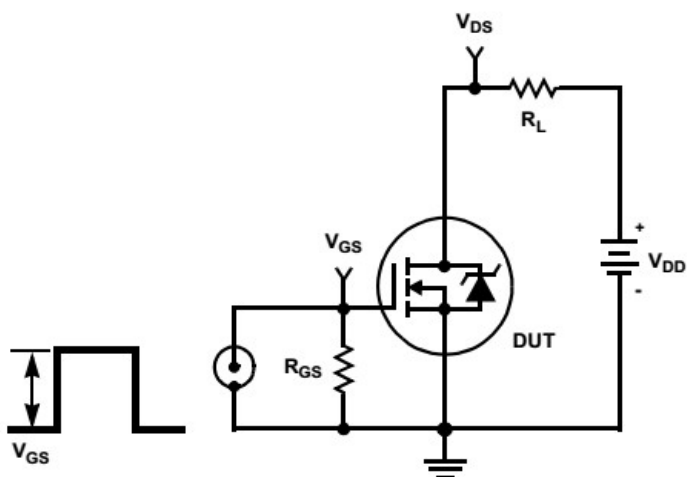


Figure 16. Switching Time Test Circuit

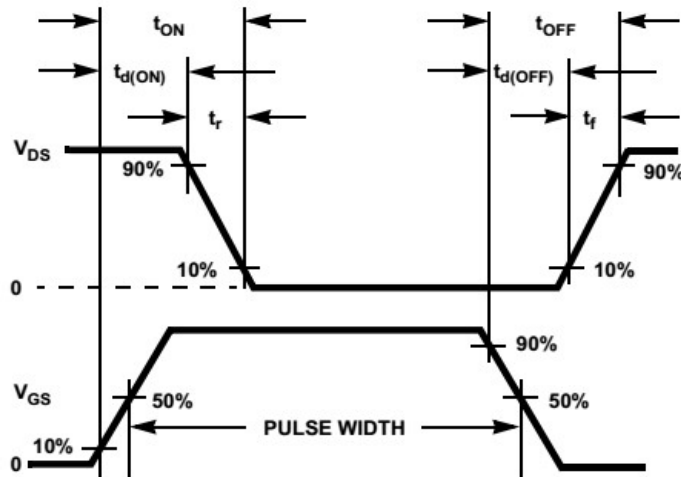
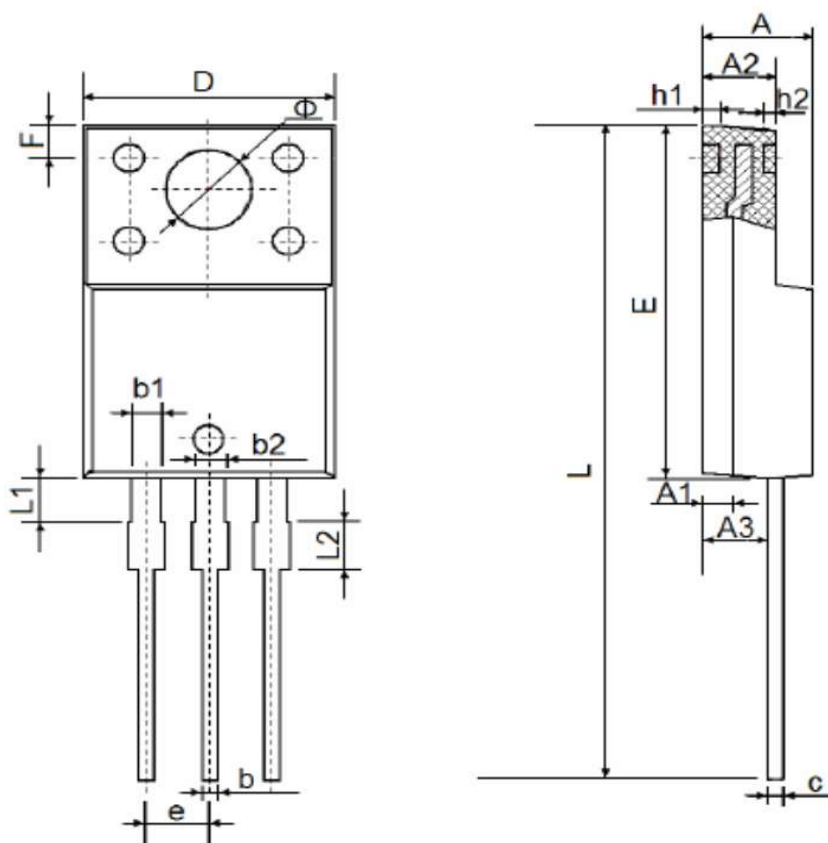


Figure 17. Switching Time Waveform

Packaging Information

PKG: TO-220F Package

unit : mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300REF		0.051REF	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540TYP.		0.100TYP	
F	2.700REF		0.106REF	
Φ	3.500REF		0.138REF	
h1	0.800REF		0.031REF	
h2	0.500REF		0.020REF	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083