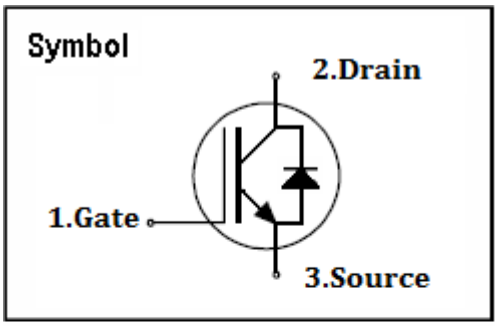
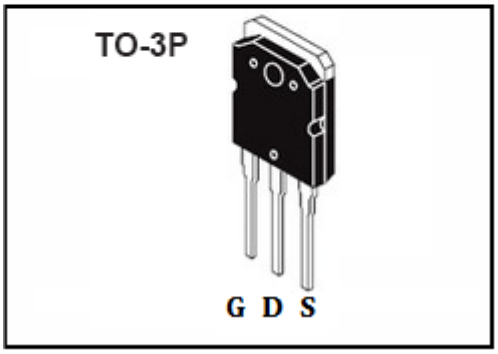
N-channel MOSFET





Features

- 500V,20A
- $R_{DS(on)}$=0.21Ω @V_{GS}=10V,I_D=10A
- High speed switching
- High ruggedness
- 100% avalanche tested
- Improved dv/dt capability

General Description

KDF20N50 is well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current(TC=25℃)	20	A
I_{DM}	Pulsed Drain Current(Note 1)	80	A
EAS	Single Pulsed Avalanche Energy(Note 2)	1100	mJ
dV/dt	Peak Diode Recovery dv/dt(Note 3)	4.5	V/ns
P_D	Maximum Power Dissipation (T_C=25℃)	280	W
	Maximum Power Dissipation (T_C=100℃)	112	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Notes:
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Starting T_J=25℃,L=5mH,R_G=50Ω ,I_D=20A,V_{GS}=10V
3. I_{SD}≤20A, di/dt≤200A/us, V_{DD}≤BV_{DSS}. Starting T_J=25℃

Thermal data

Symbol	Parameter	Max.	Units
$R_{th\ J\text{-}C}$	Thermal Resistance, Junction to case	0.44	℃ / W
$R_{th\ J\text{-}A}$	Thermal Resistance, Junction to ambient	40	℃ / W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	500	-	-	V
I_{DSSS}	Drain-Source Leakage Current	V_{DS}=500V, V_{GS}=0V	-	-	1	uA
I_{GSS}	Gate Leakage Current, Forward	V_{GS}=25V, V_{DS}=0V	-	-	100	nA
	Gate Leakage Current, Reverse	V_{GS}= -25V, V_{DS}=0V	-	-	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250uA	2	-	4.5	V
$R_{DS(on)}$	Collector-Emitter Saturation Voltage	V_{GS}=10V, I_D=10A	-	0.21	-	Ω
Q_g	Total Gate Charge	V_{DD}=400V V_{GS}=10V I_D=20A	-	70	-	nC
Q_{gs}	Gate-Source Charge		-	20	-	nC
Q_{gd}	Gate-Drain Charge		-	35	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=250V V_{GS}=10V I_D=20A R_G=25Ω	-	100	-	ns
t_r	Turn-on Rise Time		-	400	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	100	-	ns
t_f	Turn-off Fall Time		-	100	-	ns
C_{iss}	Input Capacitance	V_{DS}=25V V_{GS}=0V f = 100kHz	-	2750	-	pF
C_{oss}	Output Capacitance		-	420	-	pF
C_{rss}	Reverse Transfer Capacitance		-	40	-	pF

Source-Drain Ratings and Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage	V_{GS}=0V,I_S=20A	-	-	1.5	V
I_S	Continuous Diode Forward Current		-	-	20	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				80	A
t_{rr}	Reverse Recovery Time	V_{GS}=0V,I_S=20A dI_F/dt=100A/us	-	510		ns
Q_{rr}	Reverse Recovery Charge		-	7.3		uC

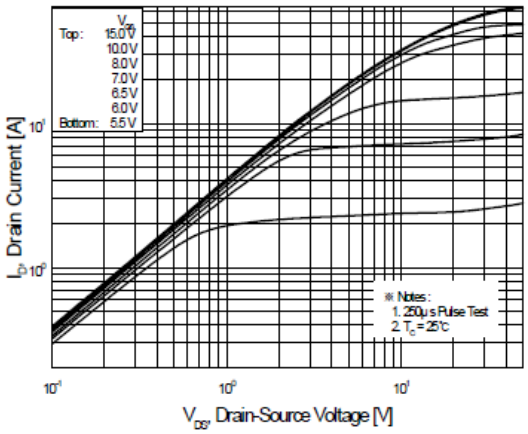


Figure 1. On-Region Characteristics

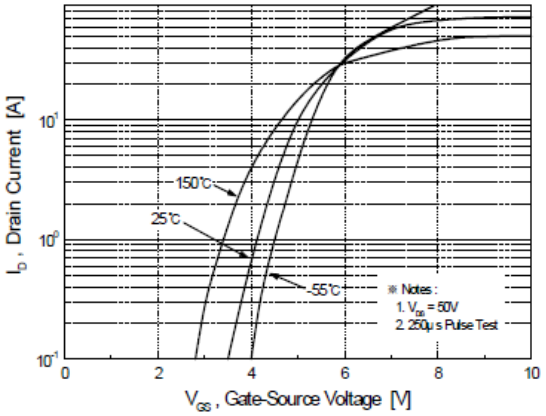


Figure 2. Transfer Characteristics

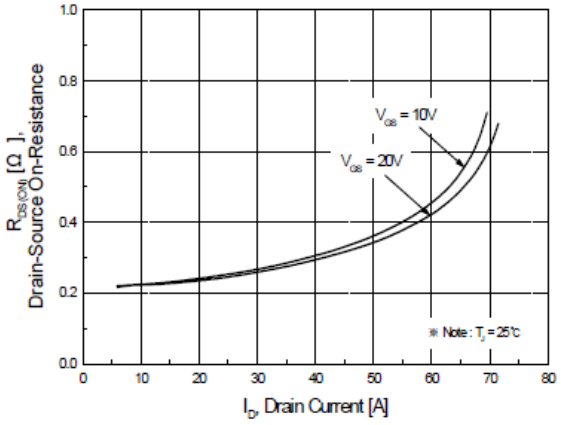


Figure 3. On-Resistance Variation vs

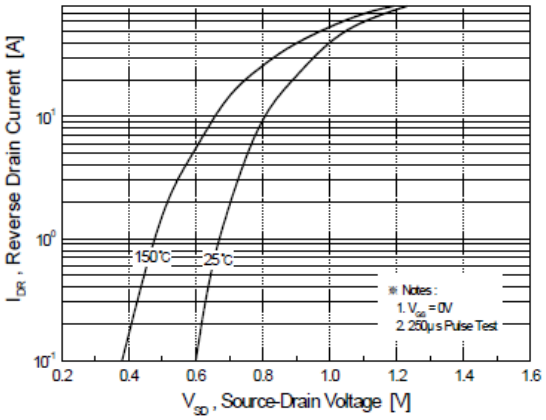


Figure 4. Body Diode Forward Voltage

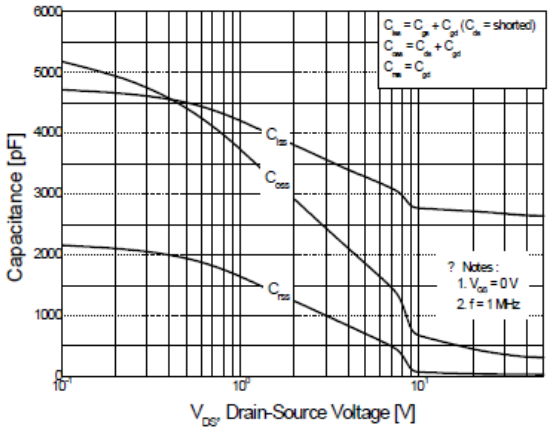


Figure 5. Capacitance Characteristics

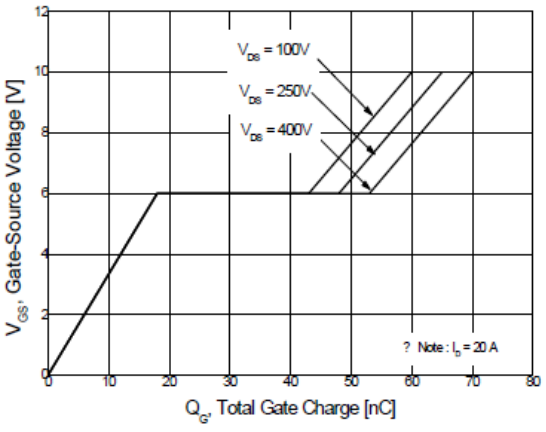


Figure 6. Gate Charge Characteristics

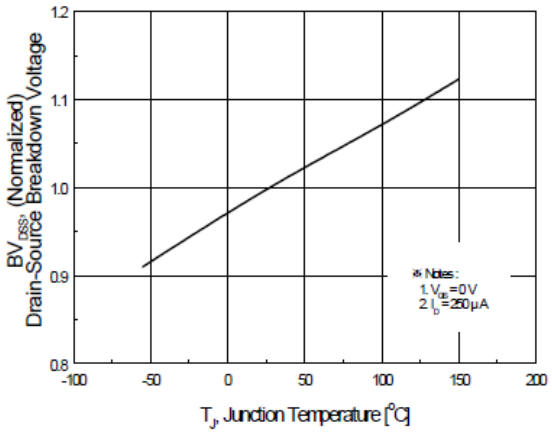


Figure 7. Breakdown Voltage Variation

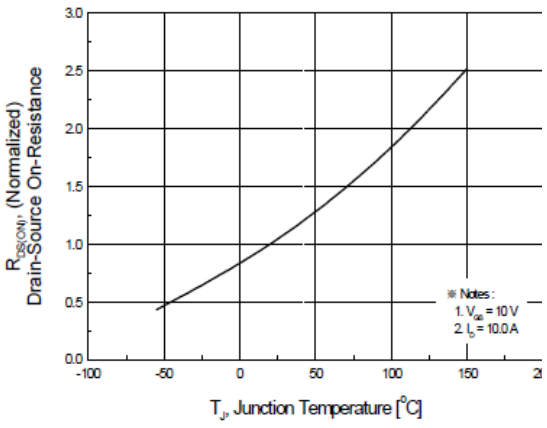


Figure 8. On-Resistance Variation

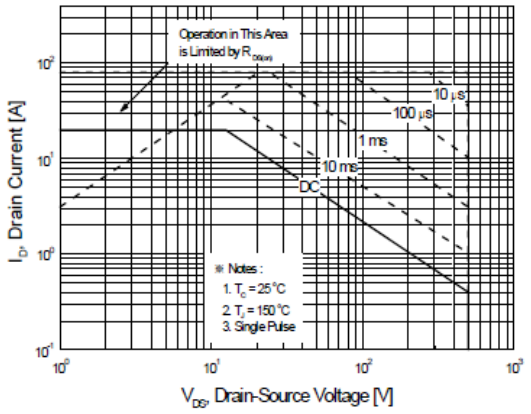


Figure 9. Maximum Safe Operating Area

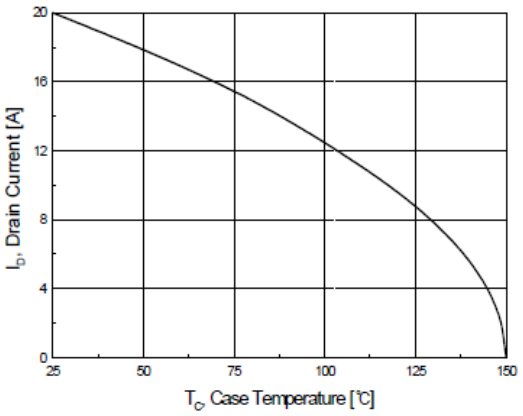


Figure 10. Maximum Drain Current vs Case Temperature

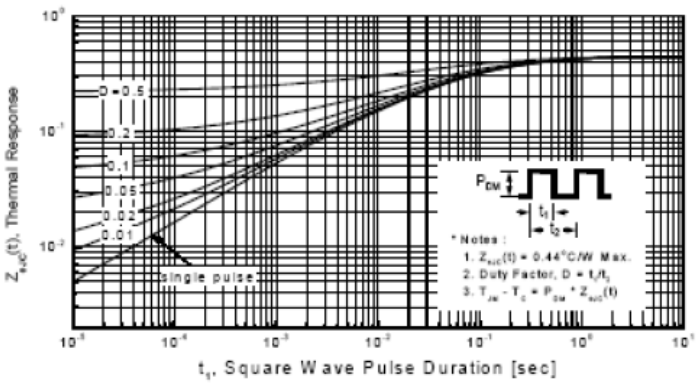


Figure 11. Transient Thermal Response Curve

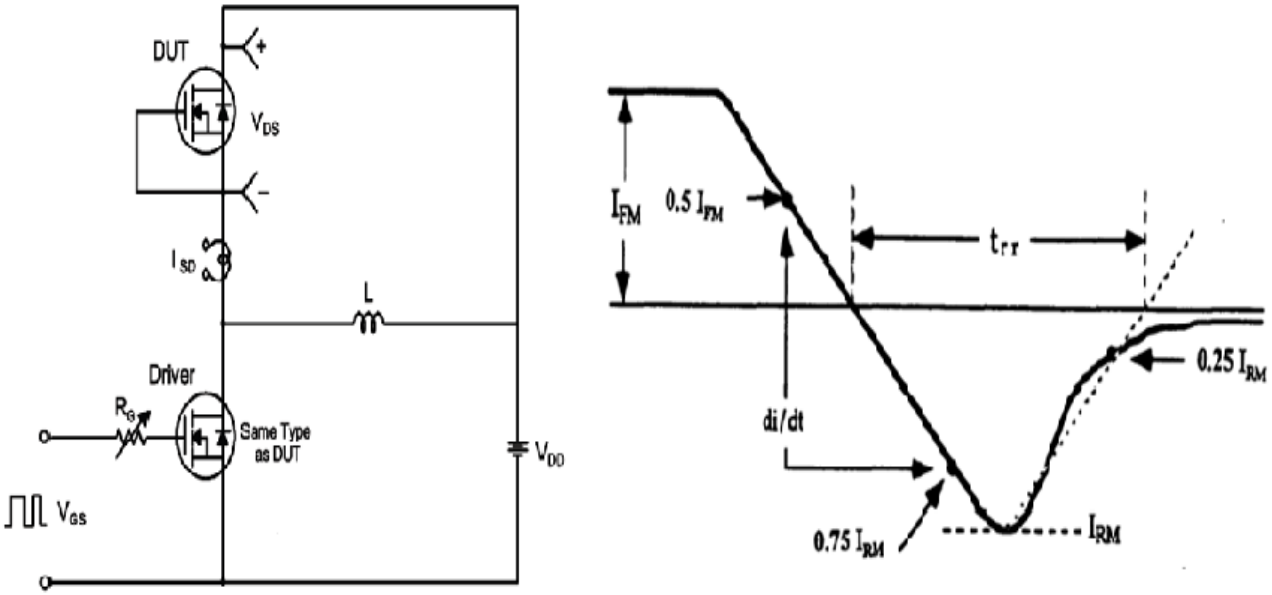


Fig12. Diode reverse recovery test circuit waveform

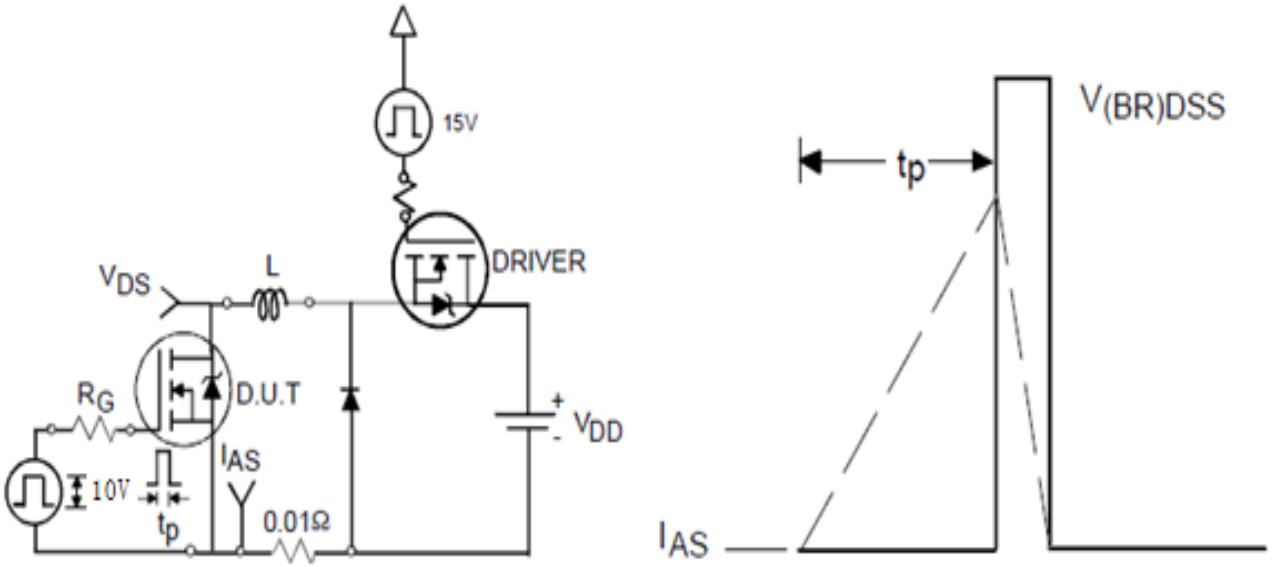


Fig13. Unclamped inductive test circuit waveform

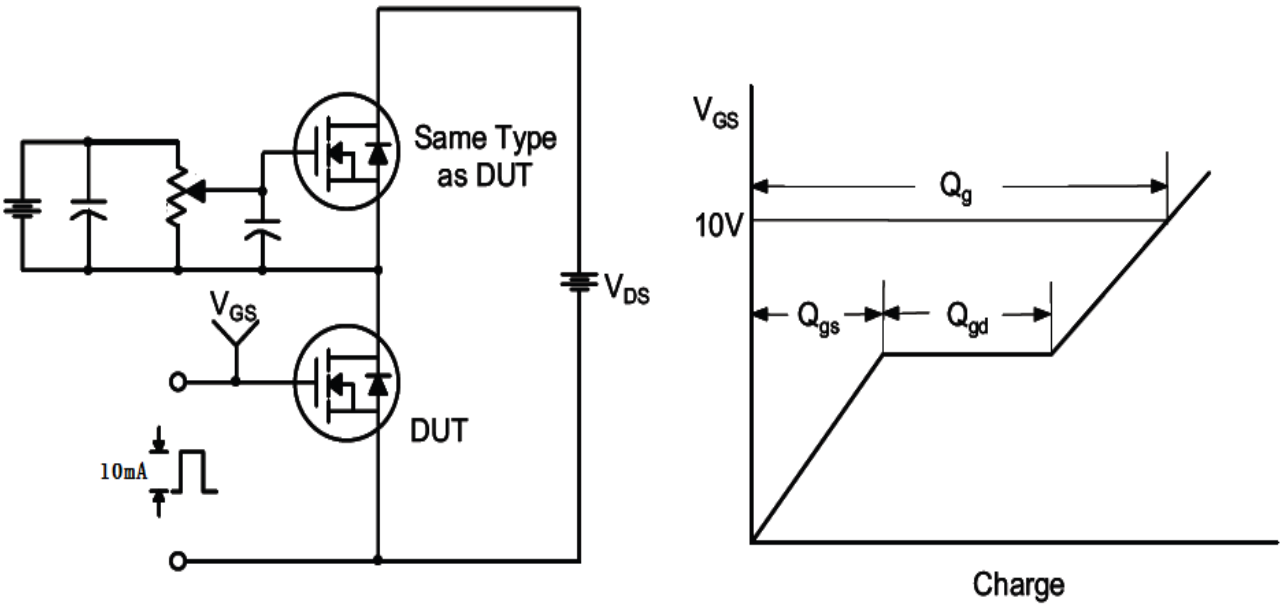


Fig14. Gate charge test circuit waveform

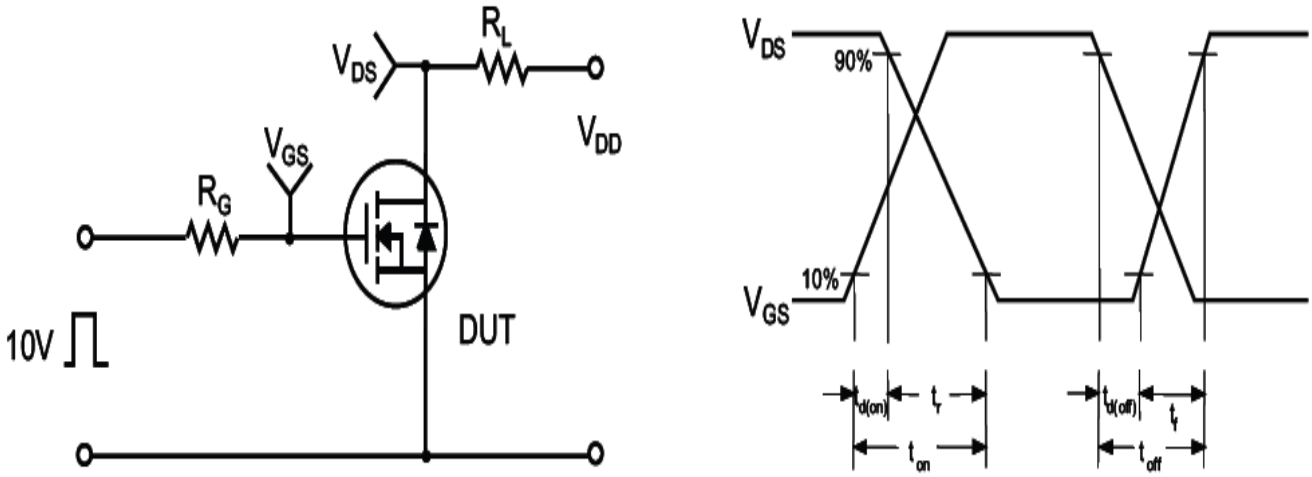
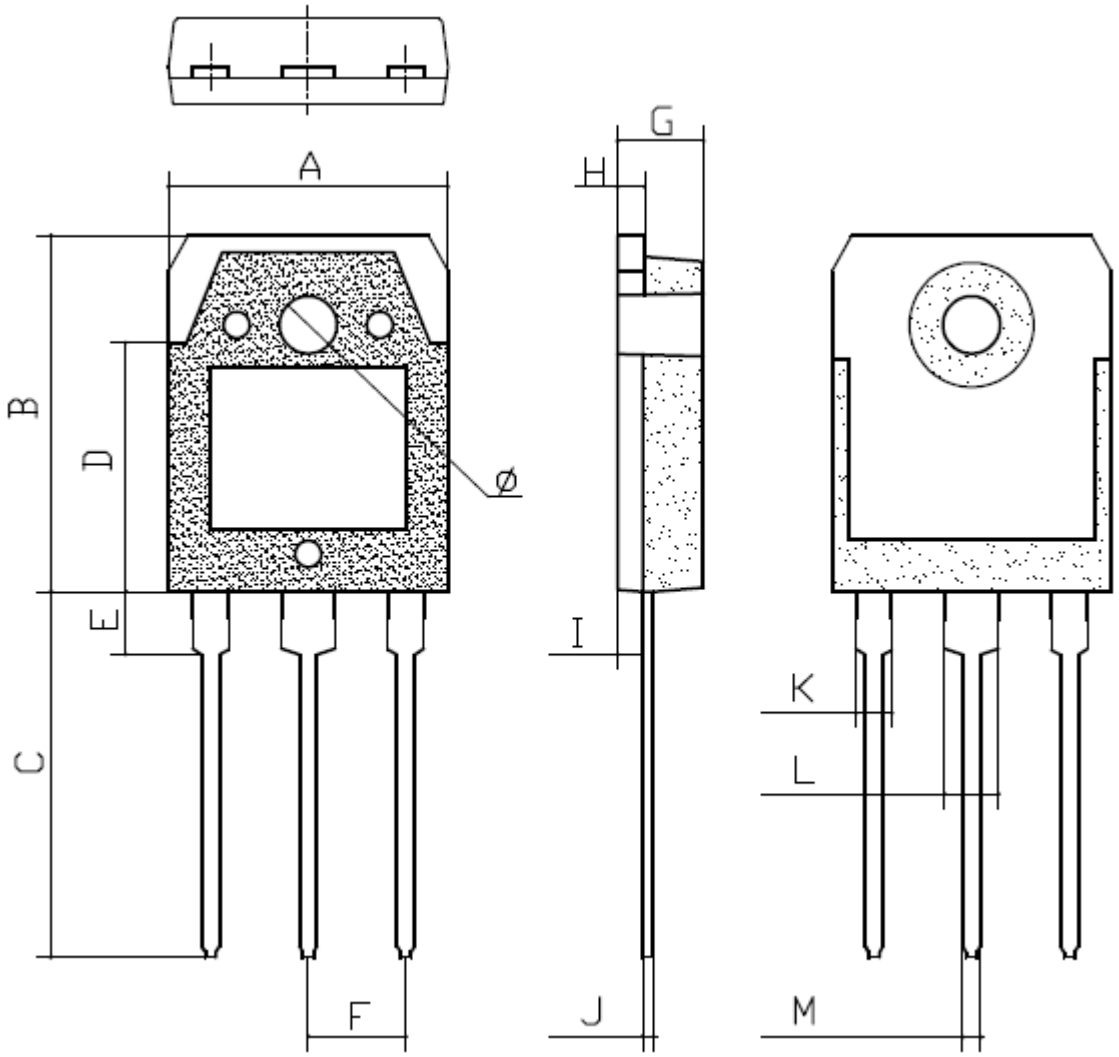


Fig15. Switching time waveform

TO3P PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	15.500	15.700	0.610	0.618
B	19.800	20.000	0.780	0.787
C	20.300	20.500	0.799	0.807
D	13.800	14.000	0.543	0.551
E	3.480	3.520	0.137	0.139
F	5.450 TYP		0.215 TYP	
G	4.700	4.900	0.185	0.193
H	1.400	1.600	0.055	0.063
I	1.330	1.430	0.053	0.056
J	0.500	0.700	0.500	0.700
K	1.980	2.020	0.078	0.080
L	2.980	3.020	0.117	0.119
M	0.980	1.020	0.039	0.040
ø	3.160	3.240	0.124	0.128

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