AUK Semiconductor

STK0460F

Advanced Power MOSFET

SWITCHING REGULATOR APPLICATIONS

Features

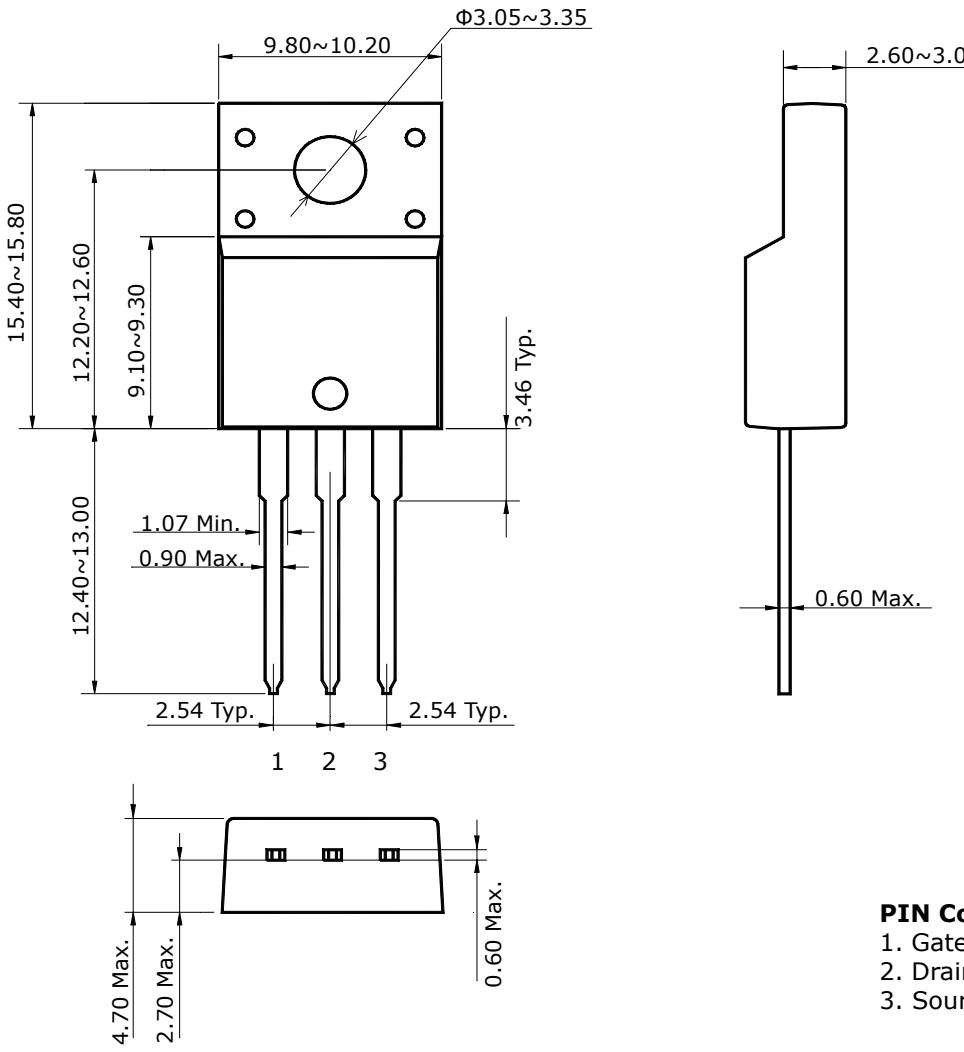
- High Voltage: BV_{DSS}=600V(Min.)
- Low C_{rss} : C_{rss}=7.5pF(Typ.)
- Low gate charge : Qg=16nC(Typ.)
- Low $R_{DS(on)}$:$R_{DS(on)}$=2.5Ω(Max.)

Ordering Information

Type NO.	Marking	Package Code
STK0460F	STK0460	TO-220F-3L

Outline Dimensions

unit : mm



PIN Connections
1. Gate
2. Drain
3. Source

Absolute maximum ratings (Tc=25°C)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		600	V
Gate-source voltage	V_{GSS}		±30	V
Drain current (DC)	I_D	(Tc=25℃)	4	A
		(Tc=100℃)	2.2	A
Drain current (Pulsed) *	I_{DM}		16	A
Drain Power dissipation	P_D		25	W
Avalanche current (Single) ②	I_{AS}		4	A
Single pulsed avalanche energy ②	E_{AS}		150	mJ
Avalanche current (Repetitive) ①	I_{AR}		4	A
Repetitive avalanche energy ①	E_{AR}		7	mJ
Junction temperature	T_J		150	℃
Storage temperature range	T_{stg}		-55~150	

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	5.0	℃/W
	Junction-ambient	$R_{th(J-a)}$	-	62.5	

Electrical Characteristics (Tc=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0	600	-	-	V
Gate-threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}= V_{GS}	2.0	-	4.0	V
Drain-source leakage current	I_{DSS}	V_{DS}=600V, V_{GS}=0V	-	-	1	μA
Gate-source leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-Source on-resistance ④	$R_{DS(ON)}$	V_{GS}=10V, I_D=2.0A	-	1.9	2.5	Ω
Forward transfer admittance ④	g_{fs}	V_{DS}=10V, I_D=2.0A	-	3.0	-	S
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	520	780	pF
Output capacitance	Coss		-	35	53	
Reverse transfer capacitance	Crss		-	7.5	12	
Turn-on delay time	$t_{d(on)}$	V_{DD}=300V, I_D=4A R_G=25Ω ③④	-	10	-	ns
Rise time	t_r		-	42	-	
Turn-off delay time	$t_{d(off)}$		-	38	-	
Fall time	t_f		-	46	-	
Total gate charge	Q_g	V_{DS}=300V, V_{GS}=10V I_D=4A ③④	-	16	24	nC
Gate-source charge	Q_{gs}		-	2.8	4.2	
Gate-drain charge	Q_{gd}		-	5.5	8.3	

Source-Drain Diode Ratings and Characteristics (Tc=25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Continuous source current	I_S	Integral reverse diode in the MOSFET	-	-	4	A
Source current (Pulsed) ①	I_{SM}		-	-	16	
Forward voltage ④	V_{SD}	V_{GS}=0V, I_S=4A	-	-	1.4	V
Reverse recovery time	t_{rr}	I_s=4A di_s/dt=100A/us	-	310	-	ns
Reverse recovery charge	Q_{rr}		-	2.26	-	uC

Note ;

① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature

② L=17mH, I_{AS}=4A, V_{DD}=50V, R_G=27Ω

③ Pulse Test : Pulse Width < 300us, Duty cycle≤ 2%

④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 I_D - V_{DS}

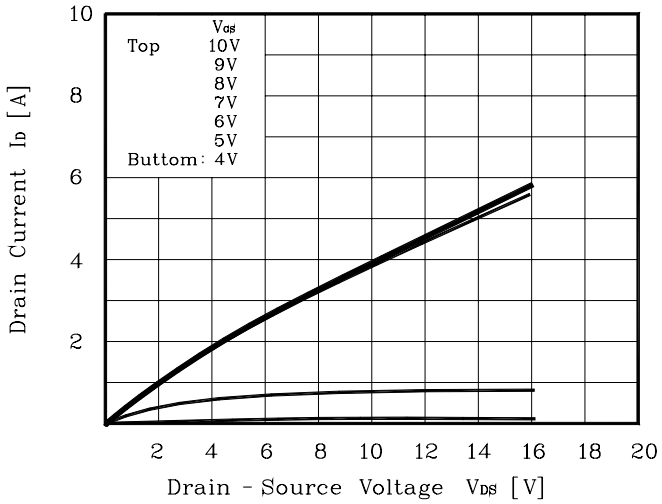


Fig. 2 I_D - V_{GS}

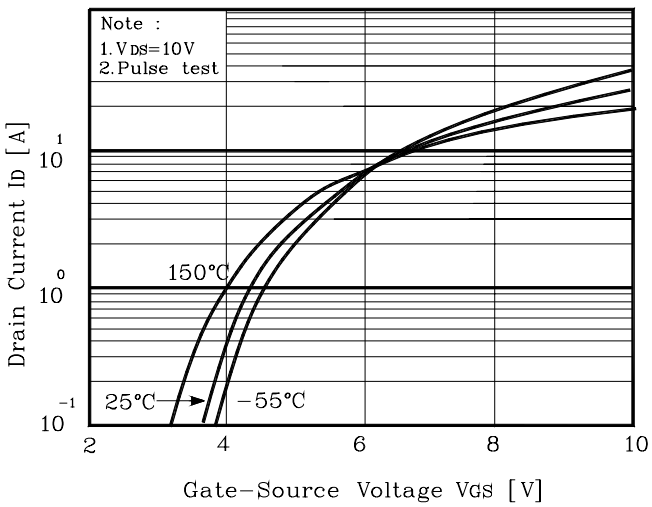


Fig. 3 $R_{DS(on)}$ - I_D

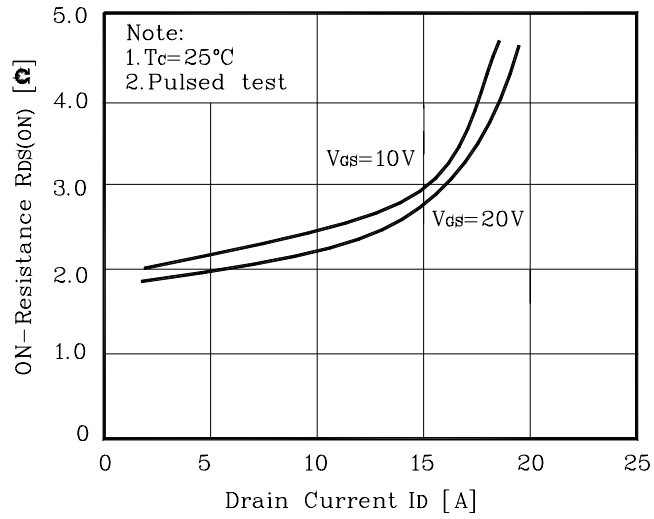


Fig. 4 I_S - V_{SD}

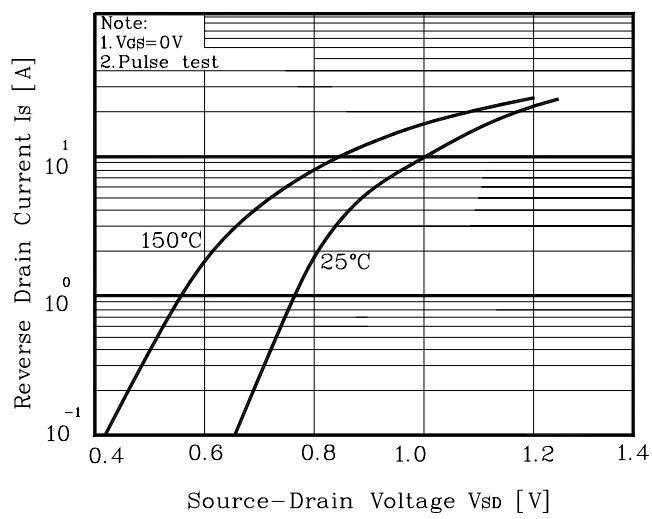


Fig. 5 Capacitance - V_{DS}

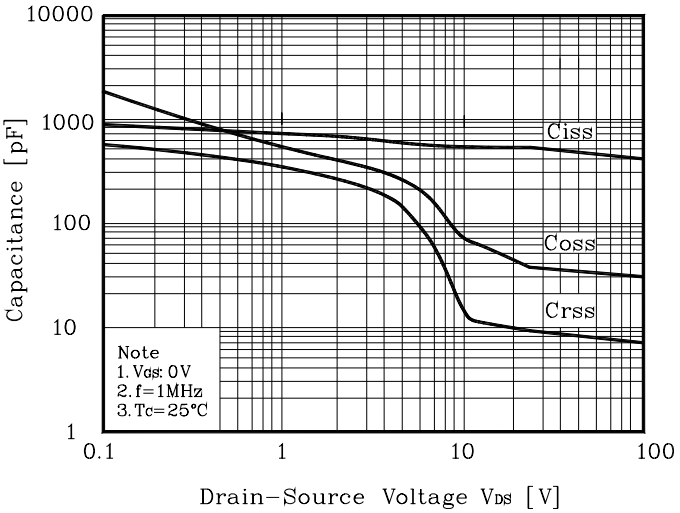


Fig. 6 V_{GS} - Q_G

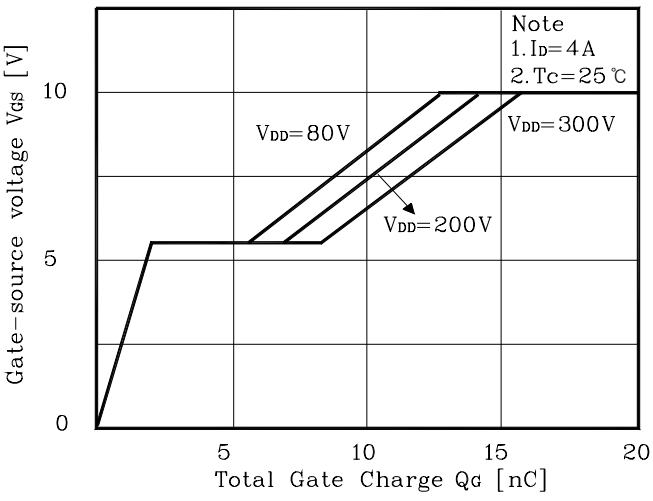


Fig. 7 V_{DSS} - T_J

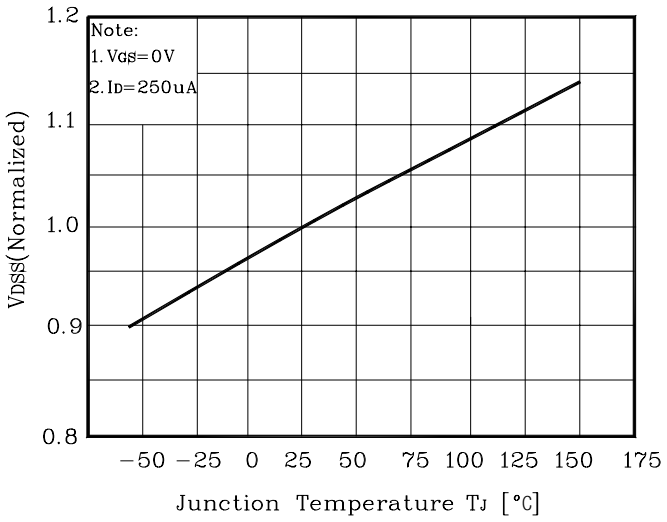


Fig. 8 $R_{DS(on)}$ - T_J

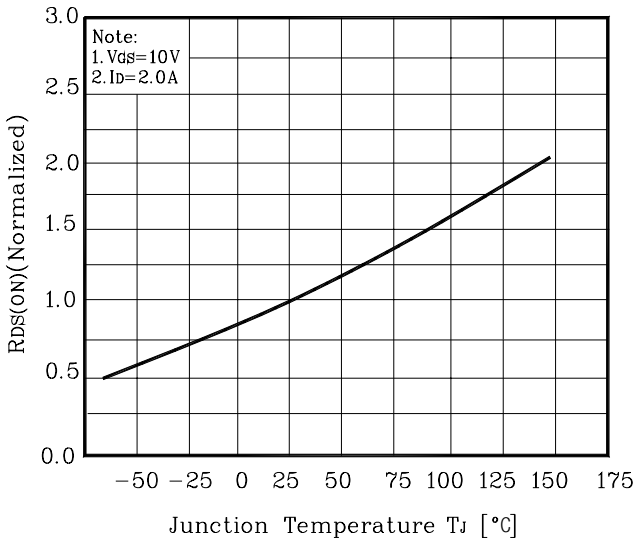


Fig. 9 I_D - T_C

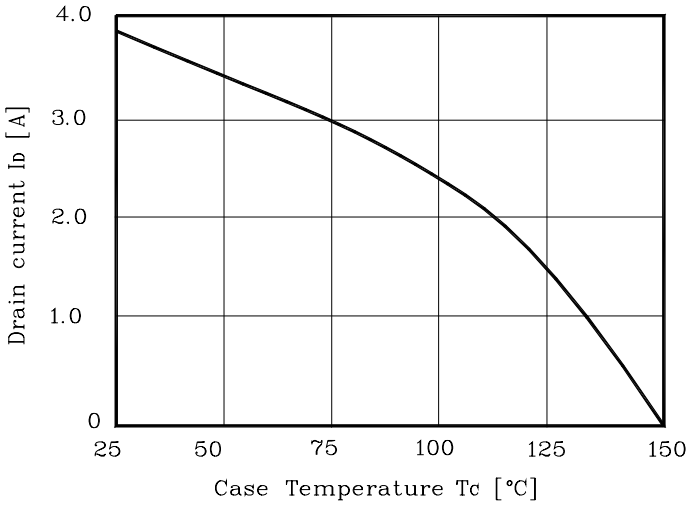


Fig. 10 Safe Operating Area

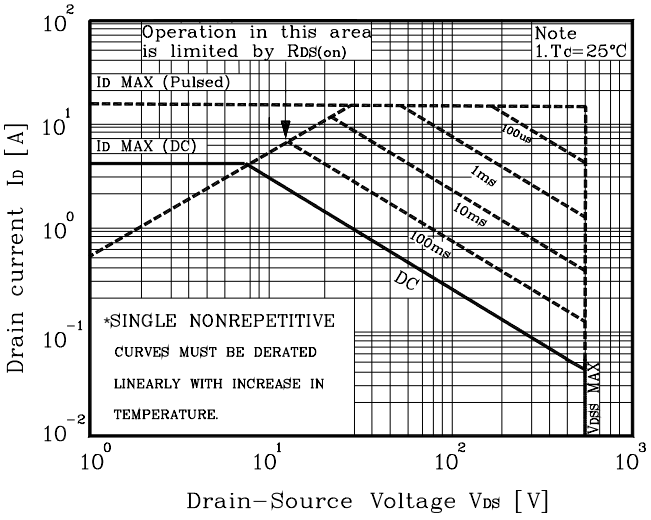


Fig. 11 Gate Charge Test Circuit & Waveform

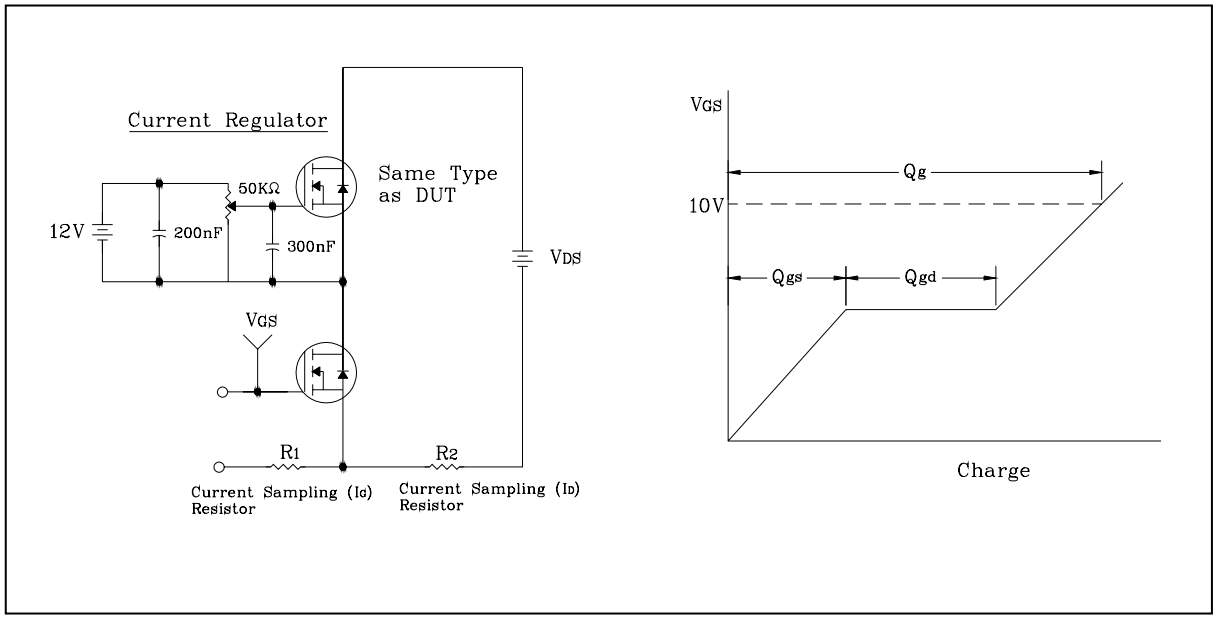


Fig. 12 Resistive Switching Test Circuit & Waveform

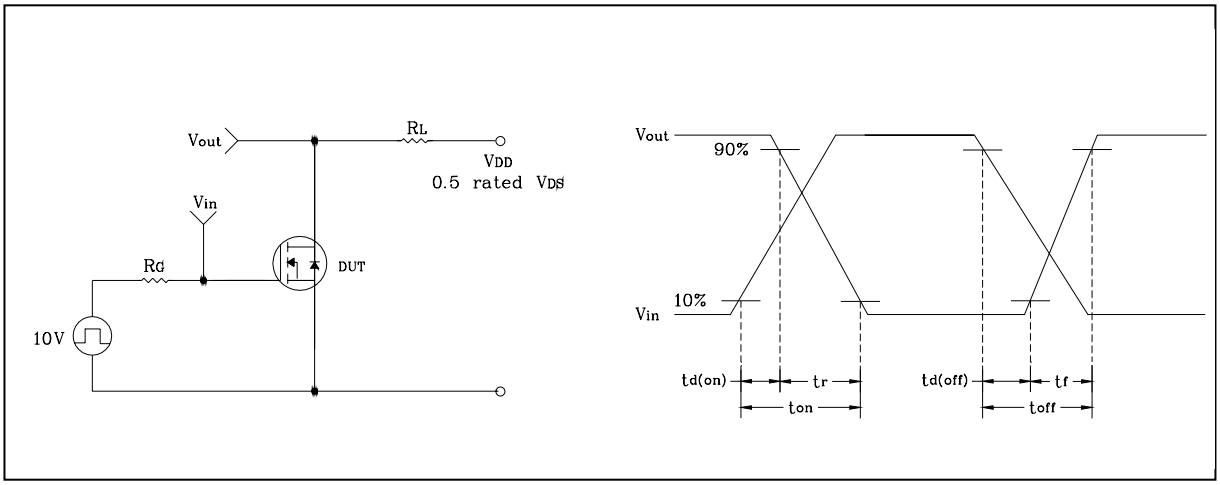


Fig. 13 E_{AS} Test Circuit & Waveform

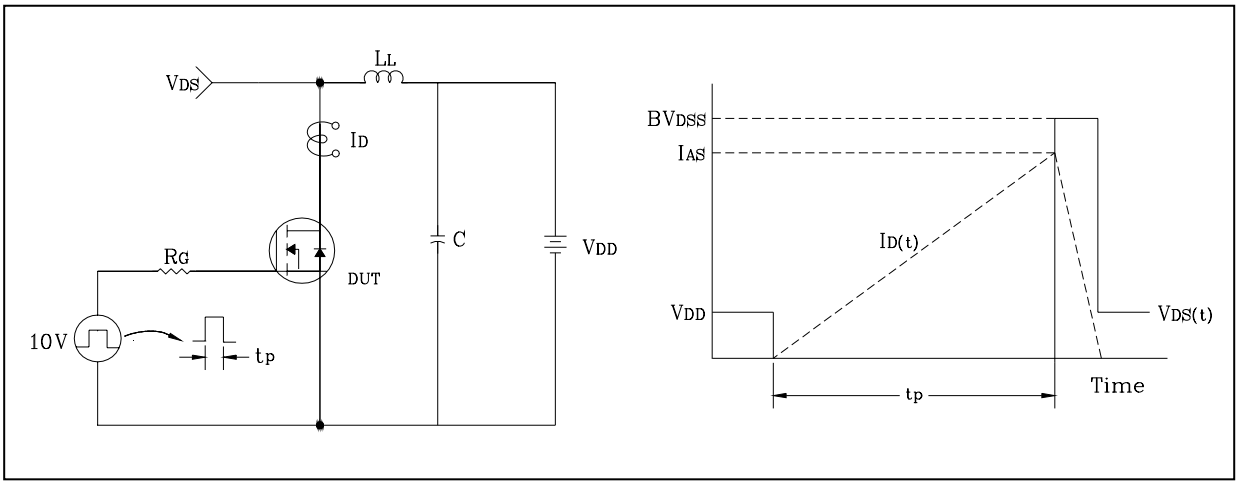
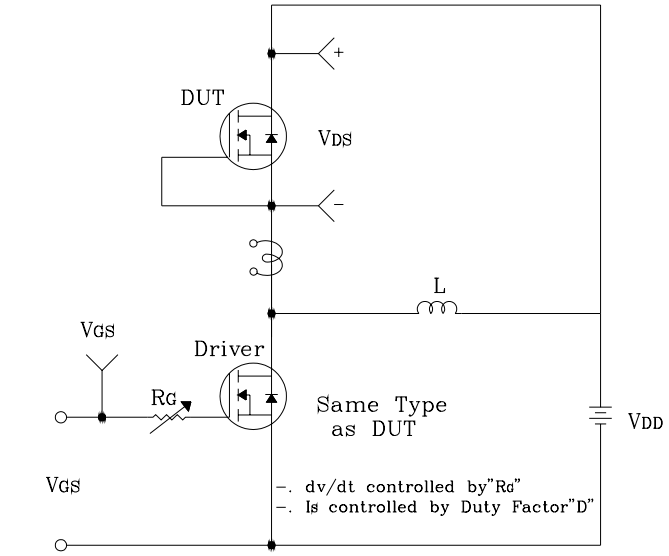
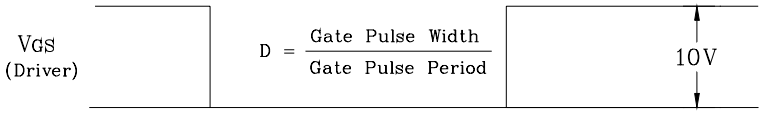
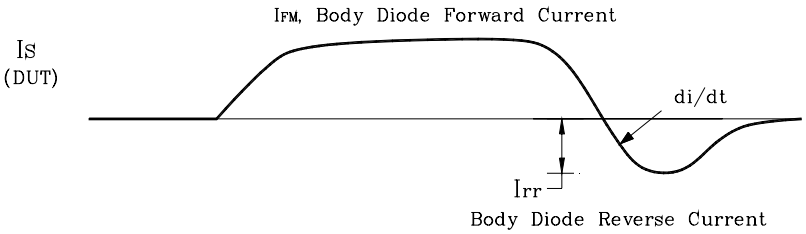
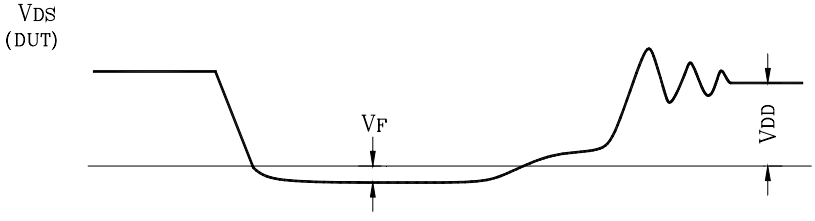


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform









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Specifications mentioned in this publication are subject to change without notice.

Product Material Sheet

PACKAGE	TO-220F(Pb-free)
WEIGHT	1620 mg/pcs

AUK Corporation

Product family name	TO-220F(Pb-free)					
Construction element	Material group	Materials	CAS if applicable	Average mass [%]	Sum mass [%]	Mass based on 1620mg
Die Composition	Silicon	see cell on left	7440-21-3	0.17	0.17	2.76
	Aluminium	see cell on left	7429-90-5	0.00		0.00
Die attach	Lead	see cell on left	7439-92-1	0.01	0.01	0.22
	Tin	see cell on left	7440-31-5	0.00		0.01
	Silver	see cell on left	7440-22-4	0.00		0.00
Leadframe	Iron (Fe)	see cell on left	7439-89-6	0.03	33.15	0.54
	Phosporous(P)	see cell on left	7723-14-0	0.01		0.19
	Copper(Cu)	see cell on left	7440-50-8	33.10		536.29
Leadframe plating	Silver	plated leadframe	7440-22-4	0.10	0.10	1.68
Wires	Gold	Gold wire	7440-57-5	0.02	0.02	0.30
Encapsulation	Resin	Mixture of phenolix and epoxy resin	29690-82-2 9003-35-4	11.46	66.03	185.59
	Silica	see cell on left	7631-86-9	53.62		868.68
	Antimony Trioxide	see cell on left	1309-64-4	0.68		10.98
	Bromine(TBBA)	see cell on left	79-94-7	0.07		1.10
	Carbon Black	see cell on left	1333-86-4	0.20		3.30
Lead finish	Tin	Tin 100%	7440-31-5	0.52	0.52	8.36
			Total Weight	100.000	100.00	1620.00

Fluctuation margin	+/-10%