FM6040K(文件编号：S&CIC2115) N-Channel Trench Power MOSFET

Description

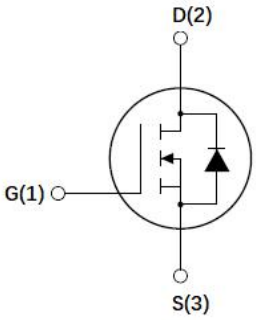
Features

- 60V/40A
  $R_{DS(ON)}$= 16.0mΩ(typ.)@V_{GS} = 10V
  $R_{DS(ON)}$= 19.8mΩ(typ.)@V_{GS} = 4.5V
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available (RoHS Compliant)

Applications

- Power Management for DC/DC
- Switching application

Package



Electrical Characteristics(Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG210N06LA1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}=250μA	60	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
		T_J=125°C	-	-	50	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.1	1.6	2.1	V
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$*	Drain-Source On-State Resistance	V_{GS}=10V,I_{DS}=20A	-	16.0	21.5	mΩ
		V_{GS}=4.5V,I_{DS}=20A	-	19.8	26.5	
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=20A,V_{GS}=0V	-	0.86	1.26	V
t_{rr}	Reverse Recovery Time	I_{SD}=20A,dI_{SD}/dt=100A/μs	-	13		ns
Q_{rr}	Reverse Recovery Charge		-	7.8		nC

Electrical Characteristics (Cont.) (Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG210N06LA1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	4.8	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}= 25V, Frequency=1.0MHz	-	1345	-	pF
C_{oss}	Output Capacitance		-	98	-	
C_{rss}	Reverse Transfer Capacitance		-	64	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}= 30V,R_G=2.5Ω,I_{DS}= 20A,V_{GS}= 10V	-	8.2	-	ns
T_r	Turn-on Rise Time		-	38.6	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	24	-	
T_f	Turn-off Fall Time		-	61	-	
Gate Charge Characteristics						
Q_g(10V)	Total Gate Charge	V_{DS} =48V, V_{GS}=10V，I_D=20A	-	28	-	nC
Q_g(4.5V)	Total Gate Charge		-	12.5	-	
Q_{gs}	Gate-Source Charge		-	5,2	-	
Q_{gd}	Gate-Drain Charge		-	5.9	-	

Note: *Pulse test，pulse width ≤ 300us，duty cycle ≤ 2%

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate-Source Voltage		±20	V
T_J	Junction Temperature Range		-55 to 155	°C
T_{STG}	Storage Temperature Range		-55 to 155	°C
I_S	Source Current-Continuous(Body Diode)	Tc=25°C	40	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	90	A
I_D	Continuous Drain Current	Tc=25°C	40	A
		Tc=100°C	27.5	A
P_D	Maximum Power Dissipation	Tc=25°C	62.8	W
		Tc=100°C	30.3	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		2.48	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		118	°C/W
E_{AS}	Single Pulsed-Avalanche Energy ***	L=0.5mH	96	mJ

Note: * Repetitive rating；pulse width limited by max. junction temperature.
** Surface mounted on FR-4 board.
*** Limited by $T_J$max , starting T_J=25°C, L = 0.5mH, R_G= 25Ω, V_{GS} =10V.

Typical Operating Characteristics

Figure 1: Power Dissipation

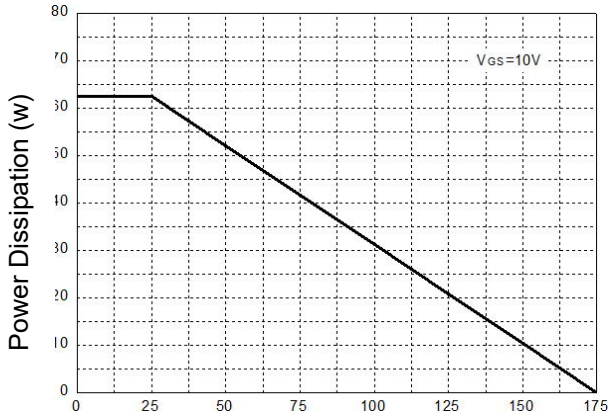


Figure 2: Drain Current

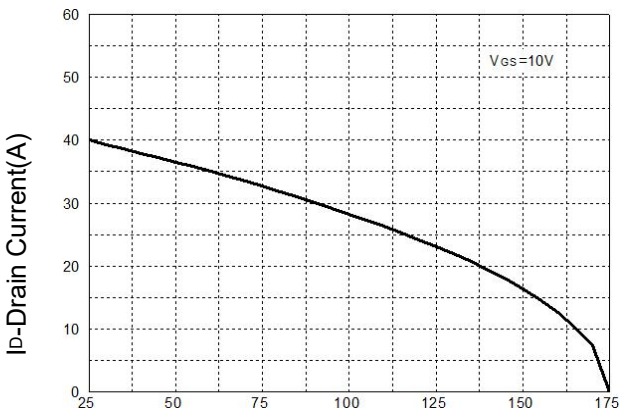


Figure 3: Safe Operation Area

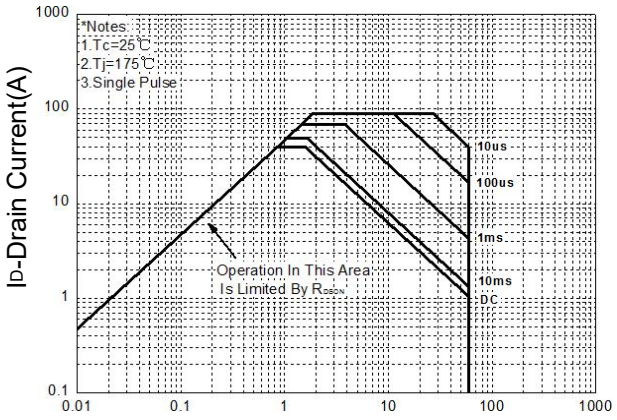
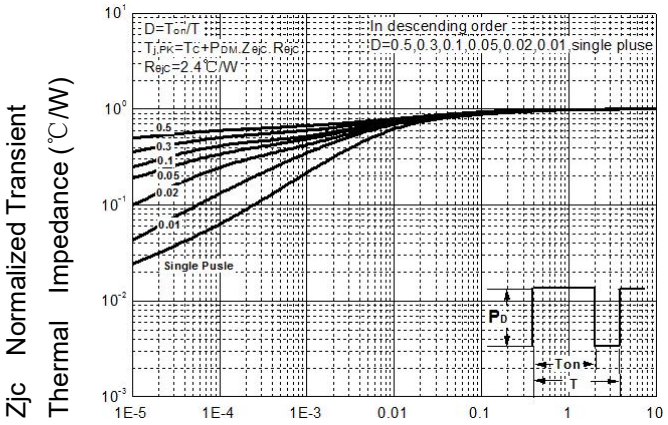


Figure 4: Thermal Transient Impedance



Maximum Effective Transient ThermalImpedance, Junction-to-Case

Figure 5: Output Characteristics

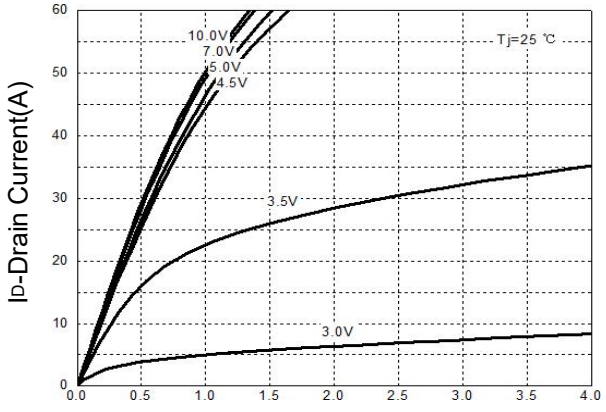
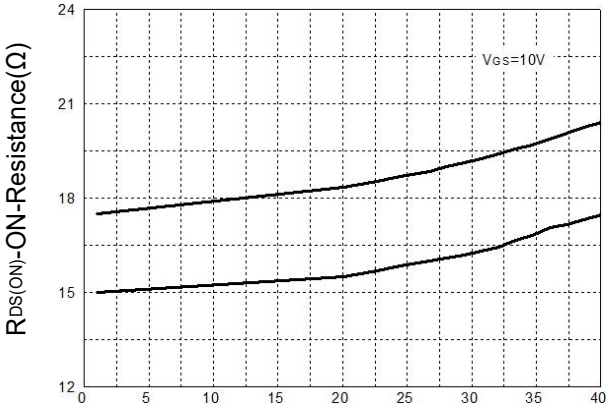
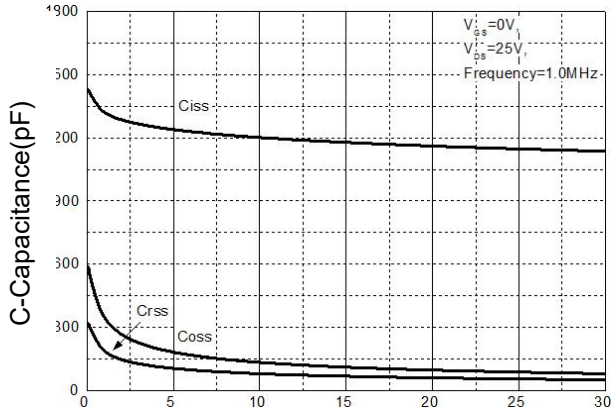


Figure 6: Drain-Source On Resistance



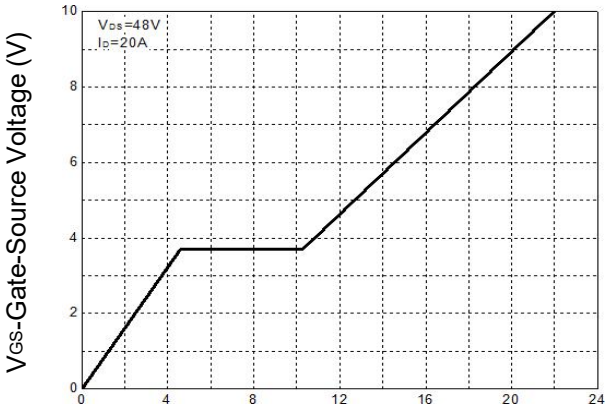
Typical Operating Characteristics(Cont.)

Figure 7: Capacitance Characteristics



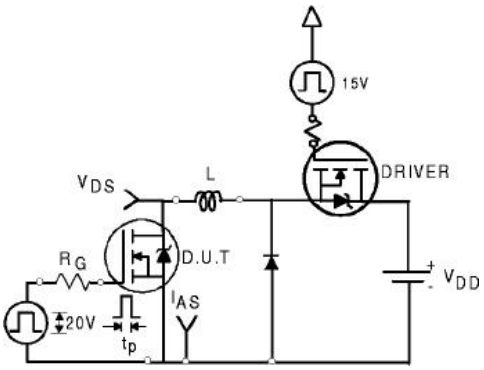
VDS-Drain-Source Voltage (V)

Figure 8: Gate Charge Characteristics

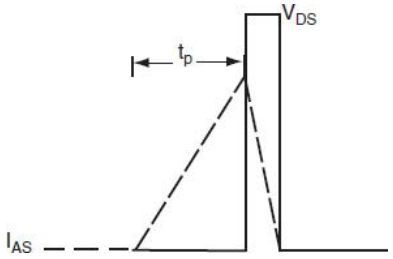


QG-Gate Charge (nC)

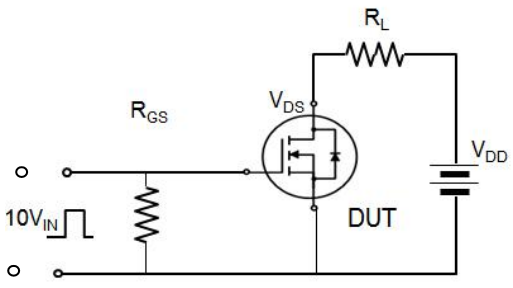
Avalanche Test Circuit

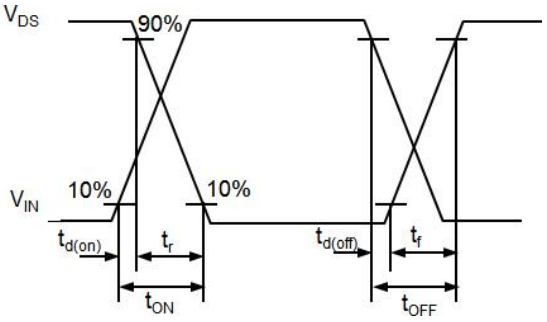


$$E_{AS} = \frac{1}{2} L I_{AS}^2$$

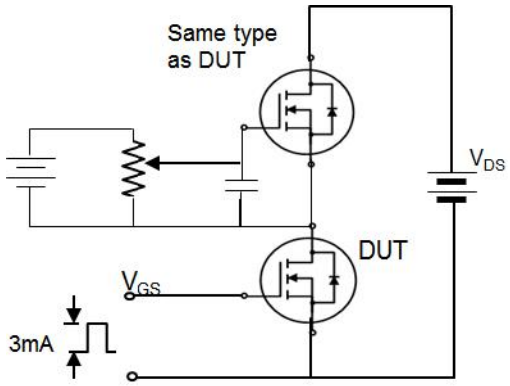


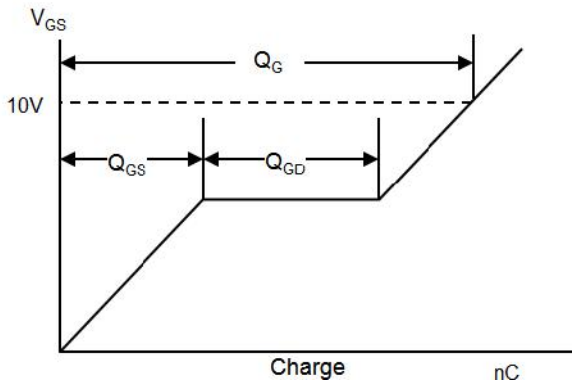
Switching Time Test Circuit



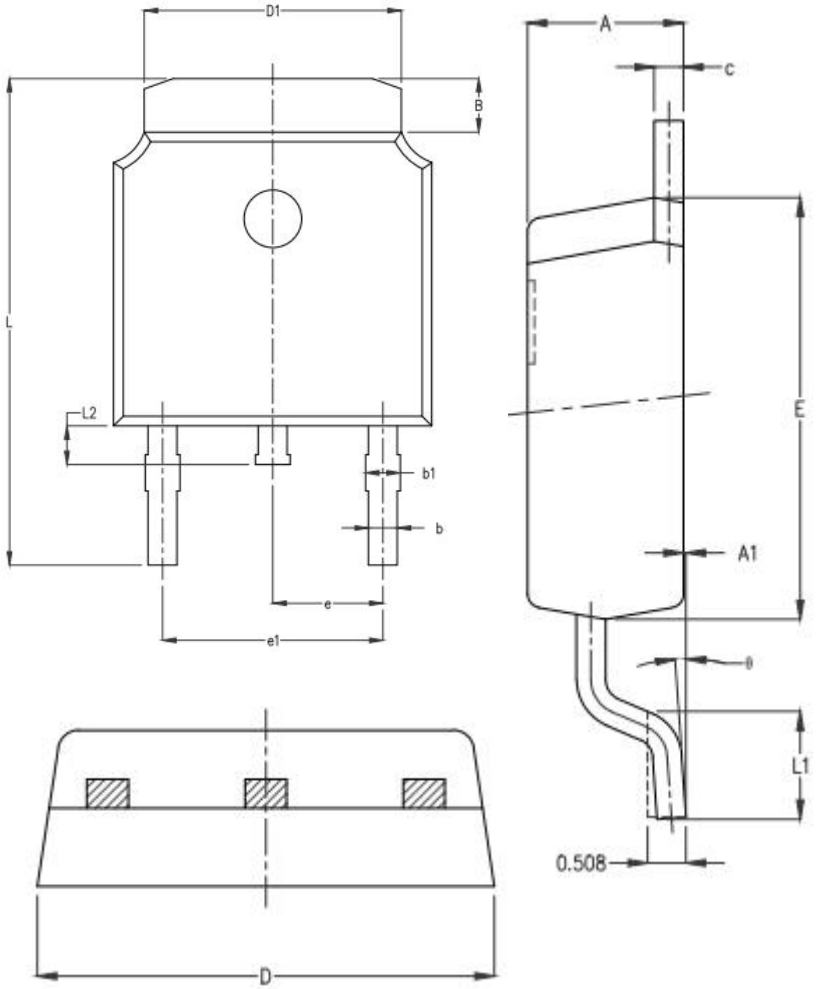


Gate Charge Test Circuit





TO-252 Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.25	2.35
A1	0.00	0.06	0.12
B	0.96	1.11	1.26
b	0.59	0.69	0.79
b1	0.69	0.81	0.93
c	0.34	0.42	0.50
D	6.45	6.60	6.75
D1	5.23	5.33	5.43
E	5.95	6.10	6.25
e	2.286TYP.		
e1	4.47	4.57	4.67
L	9.90	10.10	10.30
L1	1.40	1.55	1.70
L2	0.60	0.80	1.00
θ	0°	4°	8°