P-Channel Enhancement Mode MOSFET

Feature

- -30V/-16A
  $R_{DS(ON)}$= 5.6 @VGS = -10V
  $R_{DS(ON)}$= 8.0 @VGS = -4.5V
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available
  (RoHS Compliant)

Pin Description

Applications

- Switching application
- Li-battery protection
- DC-

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25℃ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		-30	V
V_{GSS}	Gate-Source Voltage		±20	V
T_J	Junction Temperature Range		-55 to 175	℃
T_{STG}	Storage Temperature Range			℃
I_S	Source Current-Continuous(Body Diode)	Tc=25℃	-16	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25℃	-58	A
I_D	Continuous Drain Current	Tc=25℃	-16	A
		Tc=100℃	-11	A
P_D	Maximum Power Dissipation	Tc=25℃	3	W
		Tc=100℃	1.5	W
R_{JA}	Thermal Resistance, Junction-to-Ambient **		50	℃/W
E_{AS}	Single Pulsed-Avalanche Energy ***	L=0.1mH	200	mJ

Note: * Repetitive rating; pulse width limited by max.junction temperature.
** Surface mounted on 1in2 FR-4 board.
*** Limited by $T_J$max , starting T_J=25℃ , L = 0.1mH, R_G= 25Ω, V_{GS} =10V.

Electrical Characteristics(Tc =25℃ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG045P03LQ2			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}=-250 A	-30	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=-30V,V_{GS}=0V	-	-	-1	A
		T_J=125℃	-	-	-50	A
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250 A	-1.0	-1.7	-3.0	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}=-10A	-	5.6	6.7	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V,I_{DS}=-10A	-	8.0	10.4	mΩ
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_{SD}=-10A,V_{GS}=0V	-	-0.80	-1.20	V
t_{rr}	Reverse Recovery Time	I_{SD}=-10A,dI_{SD}/dt=100A/	-	21	-	ns
Q_{rr}	Reverse Recovery Charge		-	11	-	nC

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

Symbol	Parameter	Test Conditions	HYG045P03LQ2			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=100KHz	-	4.4	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V,	-	4712	-	pF
C_{oss}	Output Capacitance	V_{DS}=-25V,	-	565	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=100KHz	-	504	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-20V,R_G=4 I_{DS}=-10A,V_{GS}=-10V	-	12	-	ns
T_r	Turn-on Rise Time		-	33	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	125	-	
T_f	Turn-off Fall Time		-	61	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge(V_{GS}=-10V)	V_{DS} =-24V, I_{DS}=-10A	-	109	-	nC
Q_g	Total Gate Charge(V_{GS}=-4.5V)			57		
Q_{gs}	Gate-Source Charge		-	17	-	
Q_{gd}	Gate-Drain Charge		-	29	-	
$V_{plateau}$	Gate plateau voltage		-	-3.3	-	V

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

Typical Operating Characteristics

Figure 1: Power Dissipation

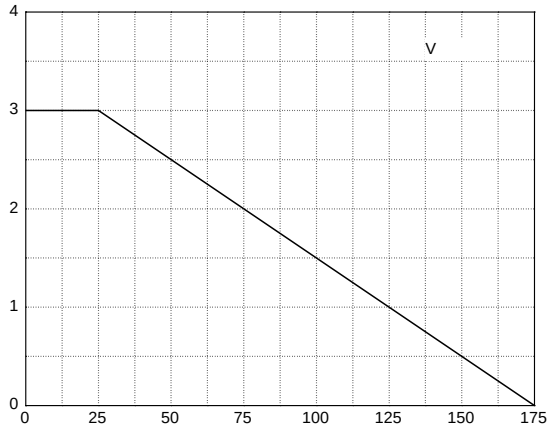


Figure 2: Drain Current

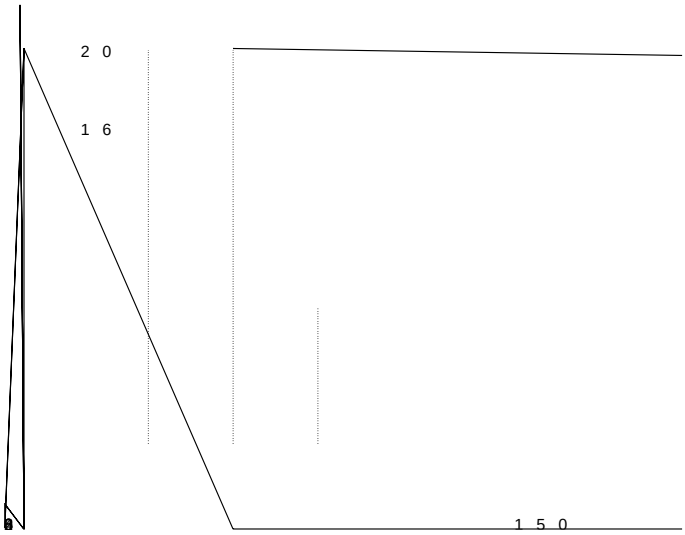


Figure 3: Safe Operation Area

Figure 4: Thermal Transient Impedance

Figure 5: Output Characteristics

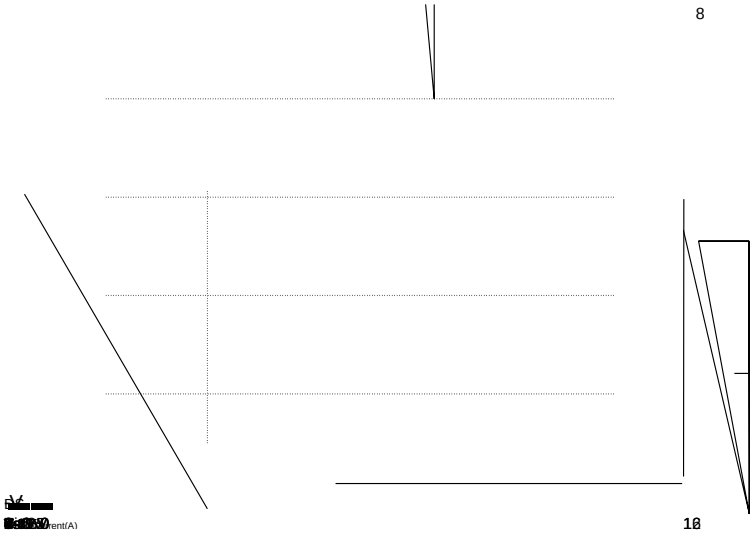
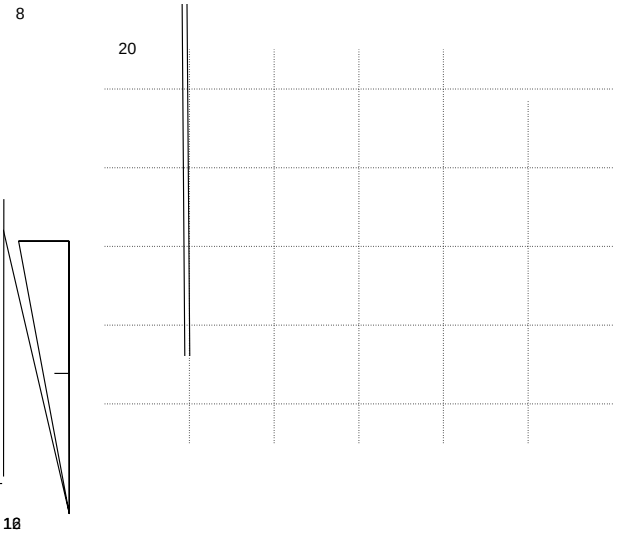


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

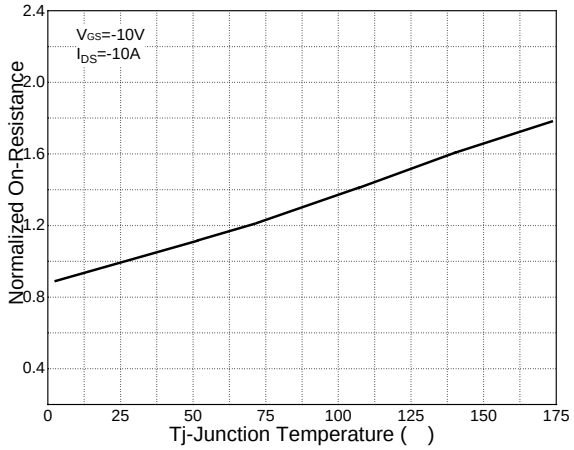


Figure 8: Source-Drain Diode Forward

Figure 9: Capacitance Characteristics

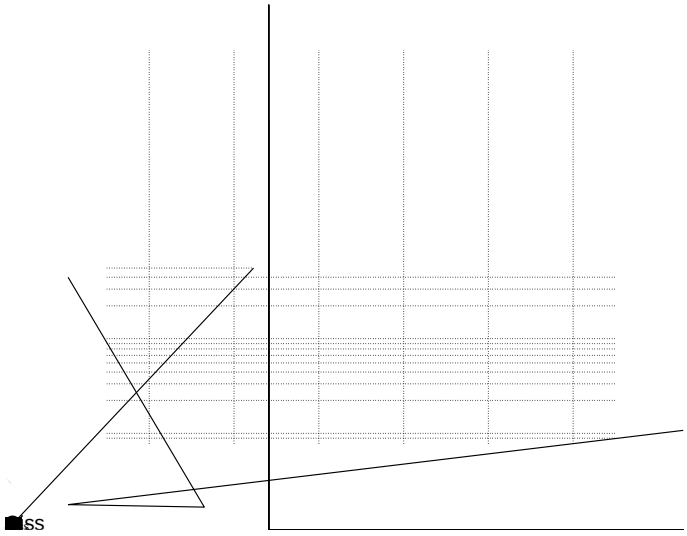
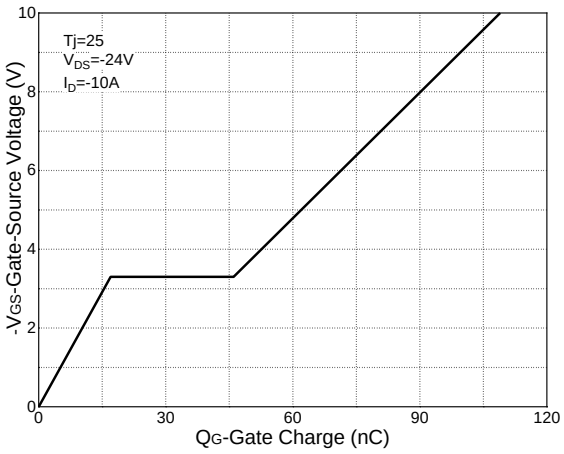
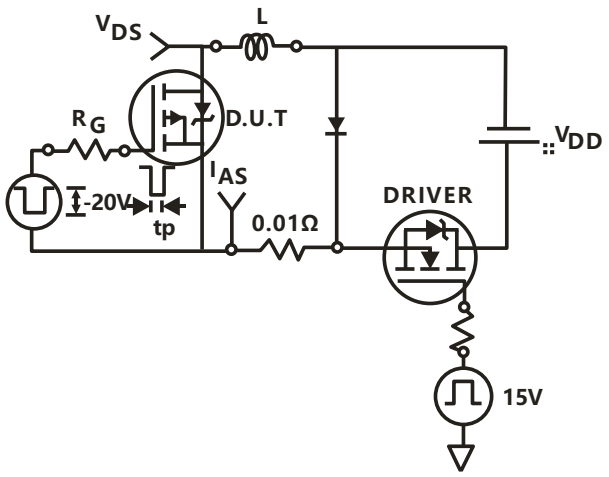
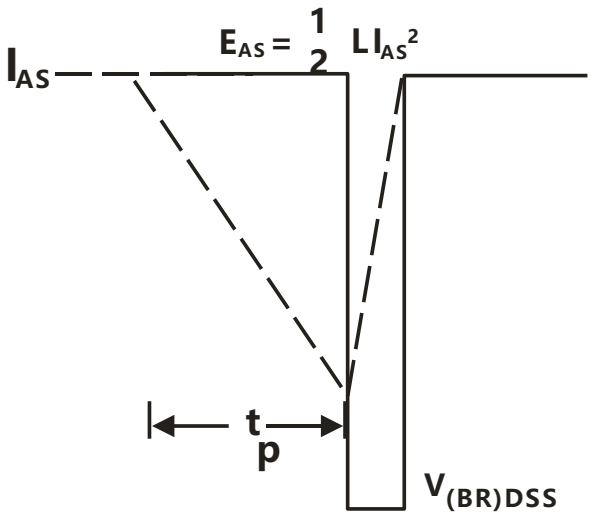


Figure 10: Gate Charge Characteristics

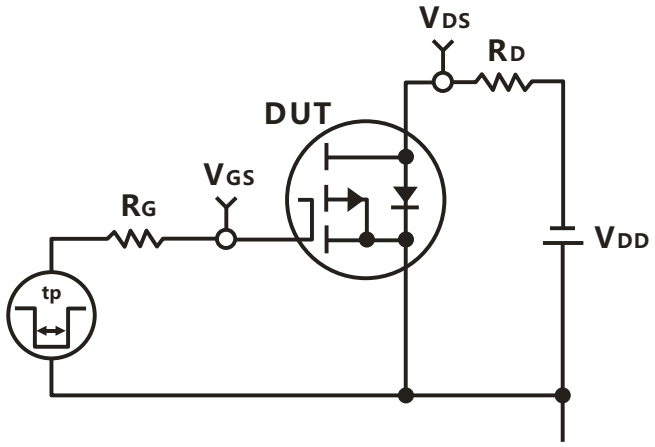


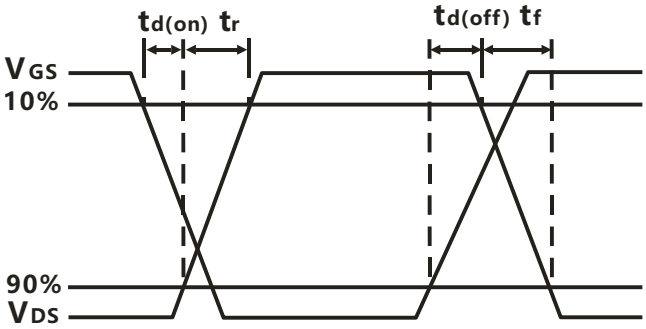
Avalanche Test Circuit



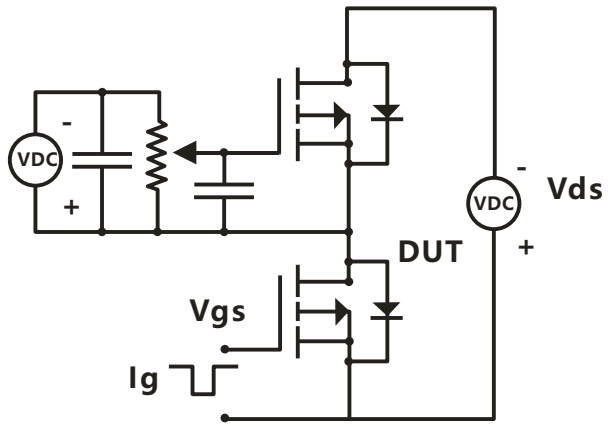


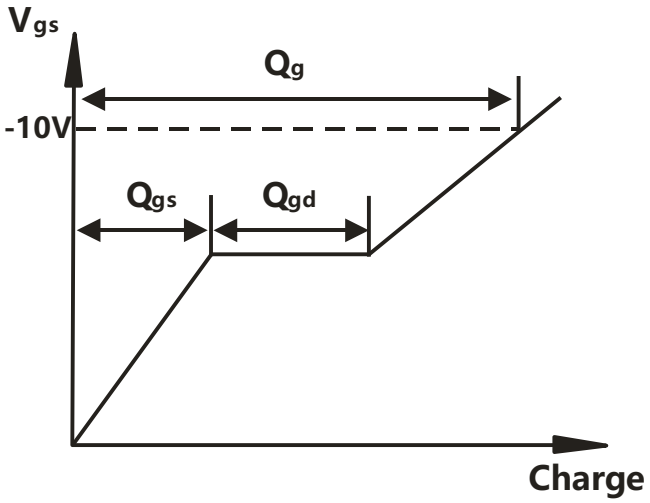
Switching Time Test Circuit





Gate Charge Test Circuit





Device Per Unit

Package Type	Unit	Quantity
SOP8L	Reel	2500

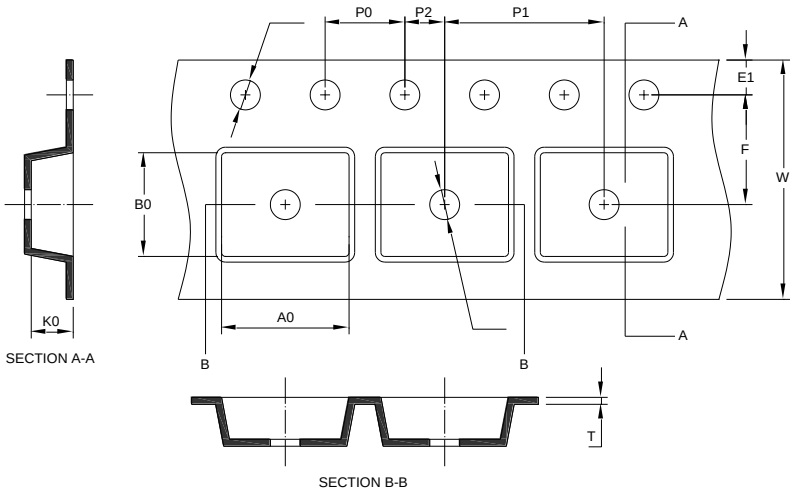
Package Information

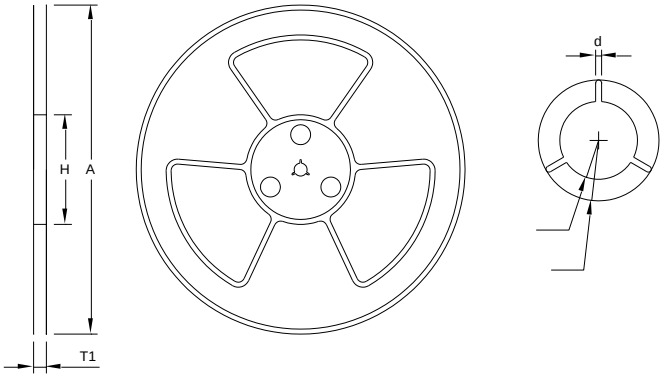
COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	-	-	1.75
A1	0.10	-	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.

Note：

1. Follow JEDEC MS-012AA。
2. ，protrusions or gate burrs.
   Mold flash，protrusion or gate burrs shall not exceed 6 mil per side.
3. Dimension E -lead flash or protrusions.
   Inter-lead flash and protrusions shall not exceed 10 mil per side.

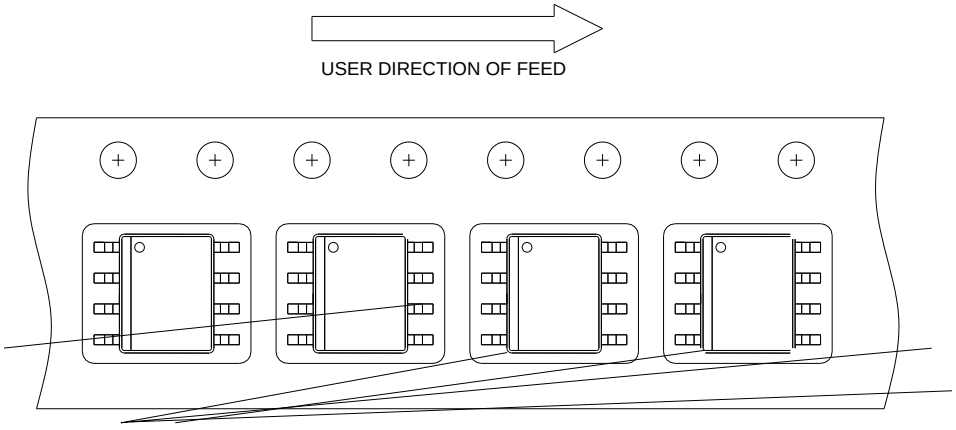
Carrier Tape & Reel Dimensions





Application	A	H	T1	C	d	D	W	E1	F
SOP8L	330 2.00	50 MIN	12.4+2.00 -0.20	13.0+0.50 -0.20	1.5 MIN	20.2 MIN	12.0 0.30	1.75 0.10	5.5 0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0 0.10	8.0 0.10	2.0 0.05	1.5+0.10 -0.00	1.5 MIN	0.6+0.00 -0.40	6.40 0.20	5.20 0.20	2.10 0.20

Taping Direction Information



Classification Profile

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin}) Temperature max (T_{smax}) Time (Tsmin to Tsmax) (t_s)	100 ℃ 150 ℃ 60-120 seconds	150 ℃ 200 ℃ 60-120 seconds
Average ramp-up rate ($T_{smax}$to T_P)	3 ℃/second max.	3℃/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 ℃ 60-150 seconds	217 ℃ 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	SeeClassification Tempin table 2
Time (t_P)** within 5℃ of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate ($T_p$to T_{smax})	6 ℃/second max.	6 ℃/second max.
Time 25℃ to peak temperature	6 minutes max.	8 minutes max.
*Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.		

Table 1.SnPb Eutectic Process Classification Temperatures (Tc)

Package Thickness	**Volume mm³ <350**	**Volume mm³ ⩾350**
＜2.5 mm	235 ℃	220 ℃