P-Channel Enhancement Mode MOSFET

Feature

- -30V/-44A
  $R_{DS(ON)}$= 10.5 @VGS = -10V
  $R_{DS(ON)}$= 18.0 @VGS = -4.5V
- 100% Avalanche Tested
- 100% DVDS
- Reliable and Rugged
- Halogen Free and Green Devices Available
  (RoHS Compliant)

Pin Description

Applications

- Switching application
- Li-battery protection
- DC-DC
- Motor control

Ordering and Marking Information

HYG
130P03

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°C	-44	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	-158	A
I_D	Continuous Drain Current	Tc=25°C	-44	A
		Tc=100°C	-31	A
P_D	Maximum Power Dissipation	Tc=25°C	48	W
		Tc=100°C	24	W
R_{JC}	Thermal Resistance, Junction-to-Case		3.1	°C/W
R_{JA}	Thermal Resistance, Junction-to-Ambient **		100	°C/W
E_{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	81	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°C, L = 0.3mH, R_G= 25Ω, V_{GS} =-10V.

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

Symbol	Parameter	Test Conditions	HYG130P03LQ1			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°C	-	-	-50	A
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250 A	-1	-1.7	-3	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}=-15A	-	10.5	12.6	mΩ
		V_{GS}=-4.5V,I_{DS}=-15A	-	18	25	mΩ
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_{SD}=-15A,V_{GS}=0V	-	-0.88	-1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=-15A,dI_{SD}/dt=-100A/	-	11.5	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.7	-	nC

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

Symbol	Parameter	Test Conditions	HYG130P03LQ1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	5	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V,	-	1436	-	pF
C_{oss}	Output Capacitance	V_{DS}=-25V,	-	183	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=1MHz	-	164	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-15V,R_G=1 I_{DS}=-15A,V_{GS}=-10V	-	8.6	-	ns
T_r	Turn-on Rise Time		-	37	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	34	-	
T_f	Turn-off Fall Time		-	42	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge(V_{GS}=-10V)	V_{DS}=-15V, I_{DS}=-15A	-	32	-	nC
	Total Gate Charge(V_{GS}=-4.5V)		-	16	-	
Q_{gs}	Gate-Source Charge		-	6	-	
Q_{gd}	Gate-Drain Charge		-	8	-	
$V_{plateau}$	Gate plateau voltage		-	-3.7	-	V

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

Typical Operating Characteristics

Figure 1: Power Dissipation

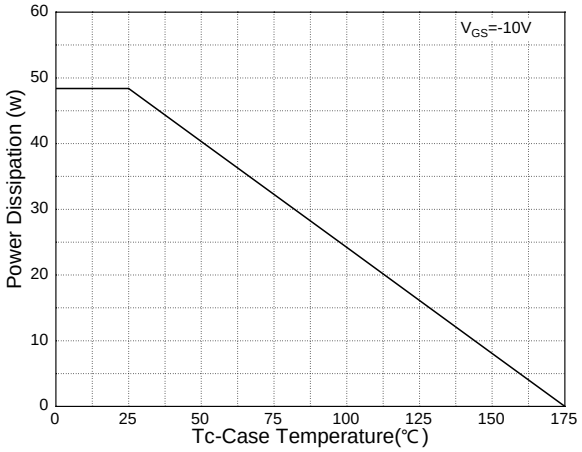


Figure 2: Drain Current

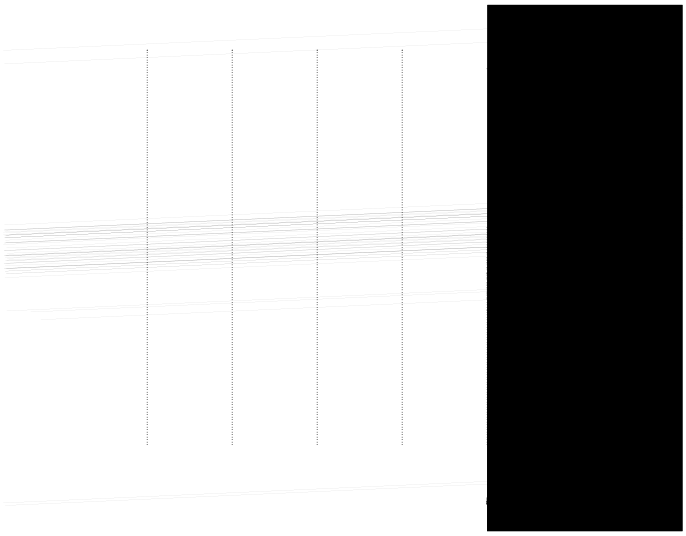


Figure 3: Safe Operation Area

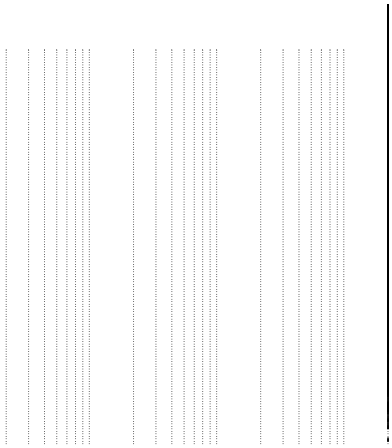


Figure 4: Thermal Transient Impedance

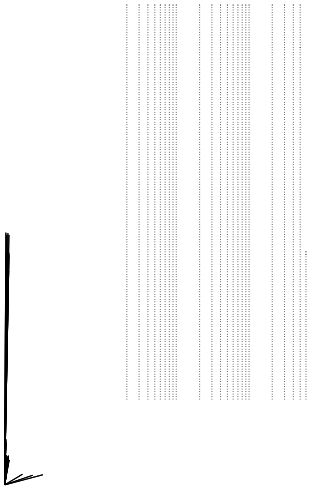


Figure 5: Output Characteristics

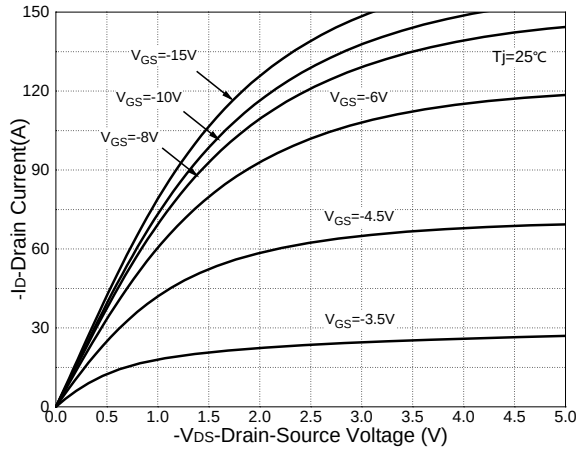


Figure 6: Drain-Source On Resistance

Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

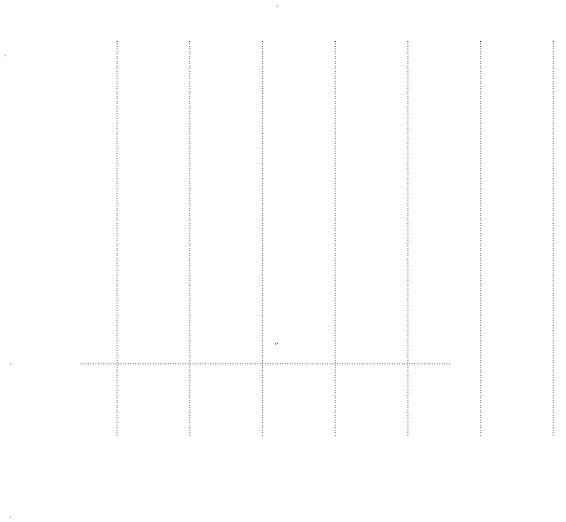


Figure 8: Source-Drain Diode Forward

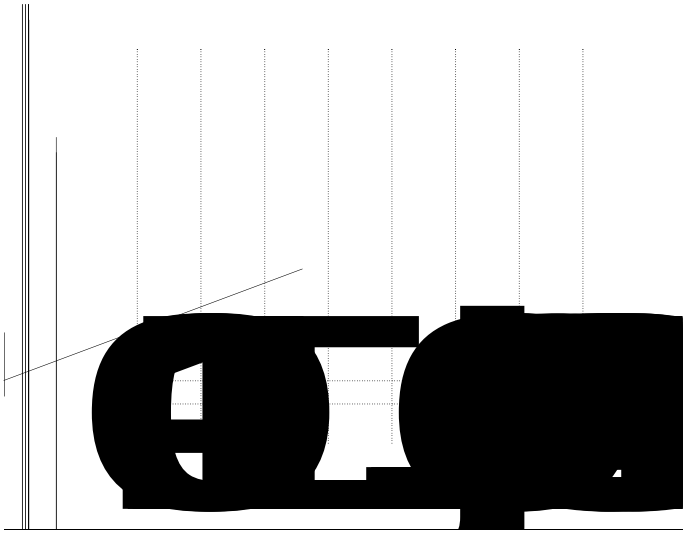


Figure 9: Capacitance Characteristics

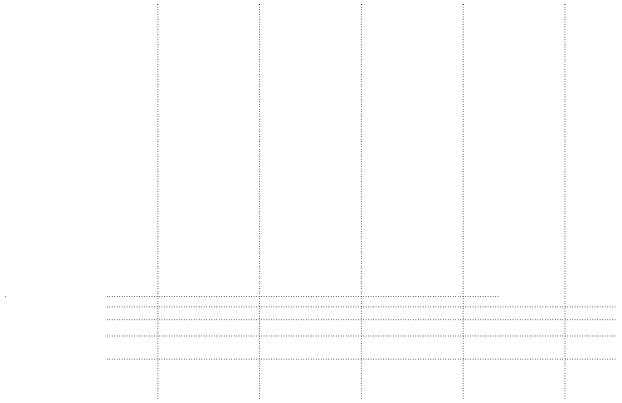
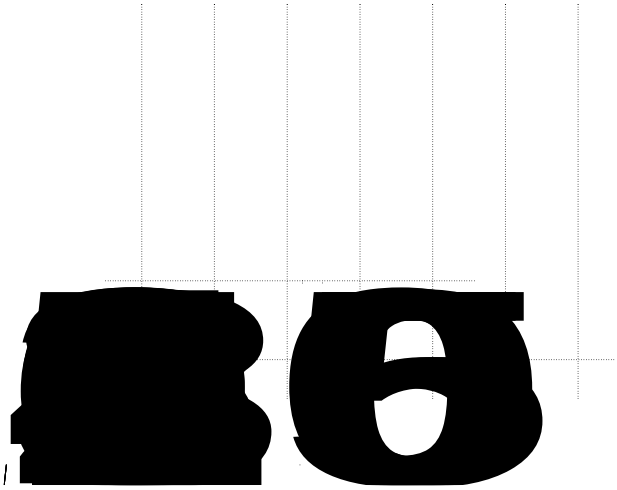
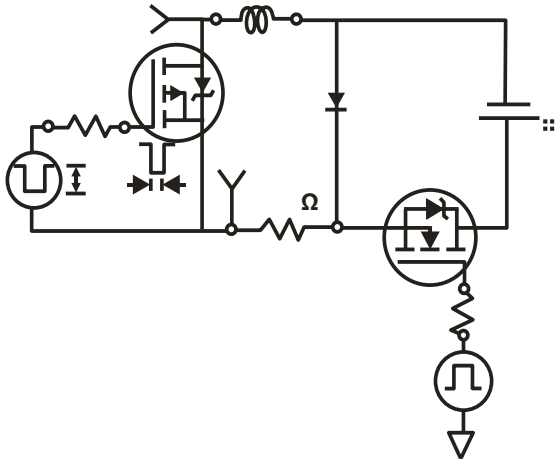
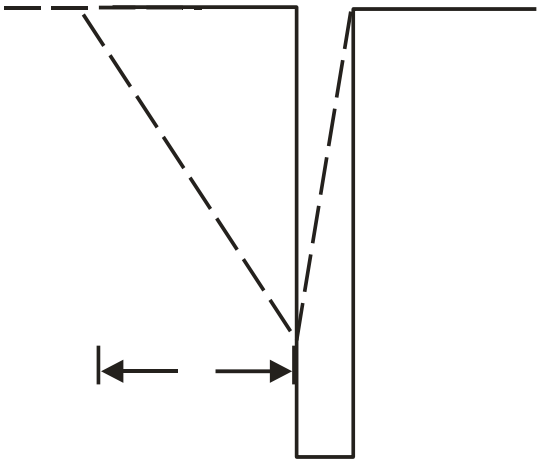


Figure 10: Gate Charge Characteristics

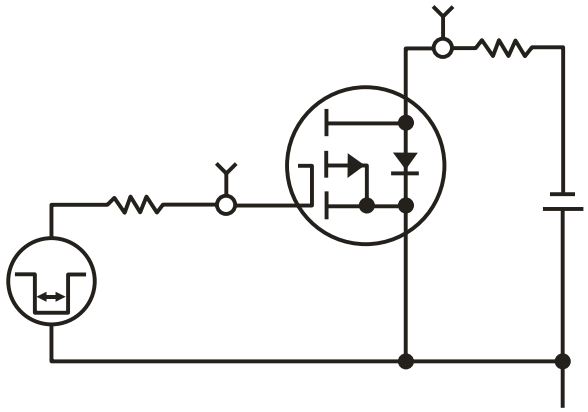


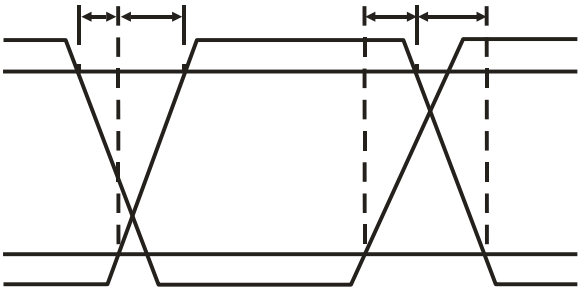
Avalanche Test Circuit



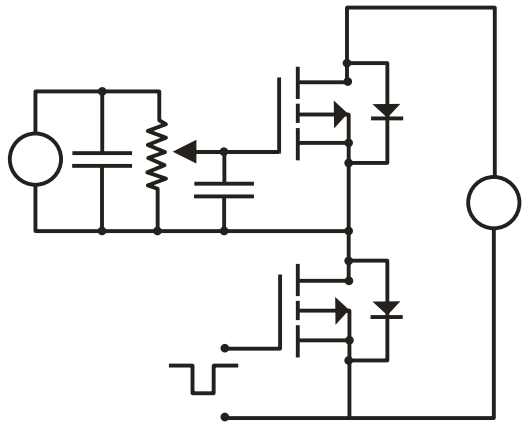


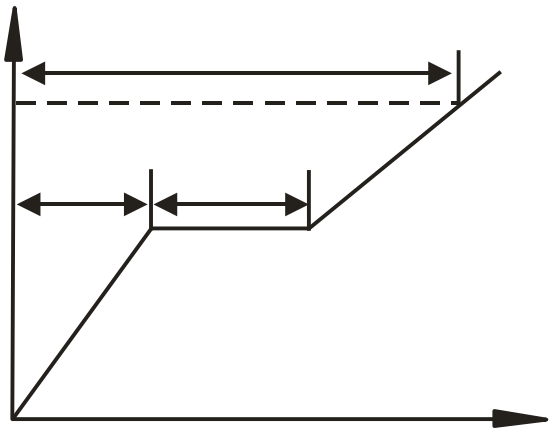
Switching Time Test Circuit





Gate Charge Test Circuit



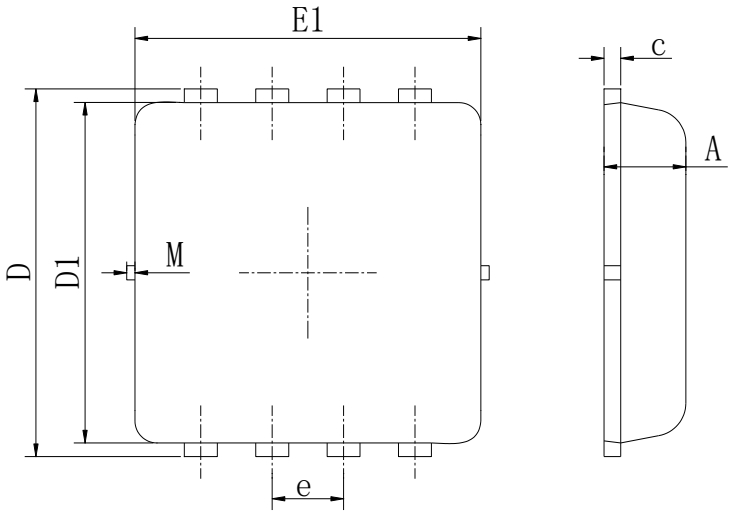


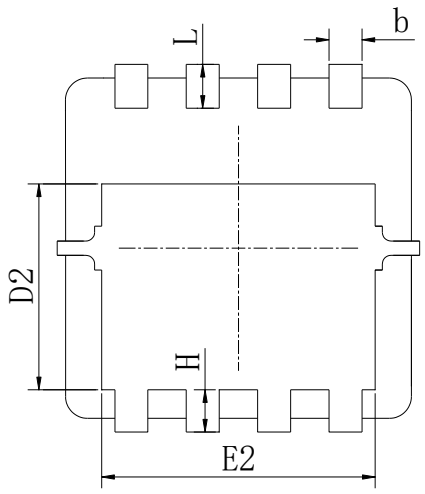
Device Per Unit

Package Type	Unit	Quantity
PDFN8L(3.3x3.3)	Reel	6500

Package Information

PDFN8L(3.3x3.3）





COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
E1	3.10	3.20	3.30
E2	2.44	2.54	2.64
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
M	\	\	0.10
*Not specified			

Classification Profile

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (Tsmin to Tsmax) (t_s)	60-120 seconds	60-120 seconds

Average /J ET ak

Table 1.SnPb Eutectic Process Classification Temperatures (Tc)

Package Thickness	Volume mm³ <350	Volume mm³ ⩾350
＜2.5 mm	235 °C	220 °C
	220 °C	220 °C

Table 2.Pb-free Process Classification Temperatures (Tc)

Package Thickness	Volume mm³ <350	Volume mm³ 350-2000	Volume mm³ ⩾2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm 2.5 mm	260 °C	250 °C	245 °C
⩾2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	168/500 Hrs, Bias @ 150°C
HTGB	JESD-22, A108	168 /500 Hrs, V_{gs}100% @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	250/500 Cycles, -55°C~150°C

Customer Service

Worldwide Sales and Service: sales@hymexa.com
Technical Support:Technology@hymexa.com
Huayi Microelectronics Co., Ltd.
No.8928,Shangji Road,Economic and Technological Development Zone,Xi'an,China
TEL: (86-029) 86685706
FAX: (86-029) 86685705
E-mail: sales@hymexa.com
Web net: http://www.hymexa.com/