HYG050N08NS1C2

N-Channel Enhancement Mode MOSFET

Feature

- 80V/100A
  $R_{DS(ON)}$=4.1 m (typ.)@V_{GS} = 10V
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen-Free Devices Available
  (RoHS Compliant)

Pin Description

Applications

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		80	V
V_{GSS}	Gate-Source Voltage		20	V
T_J	Junction Temperature Range		-55 to 175	℃
T_{STG}	Storage Temperature Range		-55 to 175	℃
I_S	Source Current-Continuous(Body Diode)	Tc=25°C	100	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	**410	A
I_D	Continuous Drain Current	Tc=25°C	100	A
		Tc=100°C	70.7	A
P_D	Maximum Power Dissipation	Tc=25°C	93.7	W
		Tc=100°C	46.8	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		1.6	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		35	°C/W
E_{AS}	SinglePulsed-Avalanche Energy ***	L=0.3mH	350***	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	HYG050N08NS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}= 250 A	80	-	-	V
I_{DSS}	Drain-to-Source Leakage Current					

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

Symbol	Parameter	Test Conditions	HYG050N08NS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	2.6	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V,	-	4280	-	pF
C_{oss}	Output Capacitance	V_{DS}= 25V,	-	1770	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz	-	25	-	
$t_{d(ON)}$	Turn-on Delay Time		-	17	-	ns
T_r	Turn-on Rise Time	V_{DD}= 40V,R_G=4.0	-	87	-	
$t_{d(OFF)}$	Turn-off Delay Time	I_{DS}= 50A,V_{GS}= 10V	-	47	-	
T_f	Turn-off Fall Time			101	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge					

Typical Operating Characteristics

Figure 1: Power Dissipation

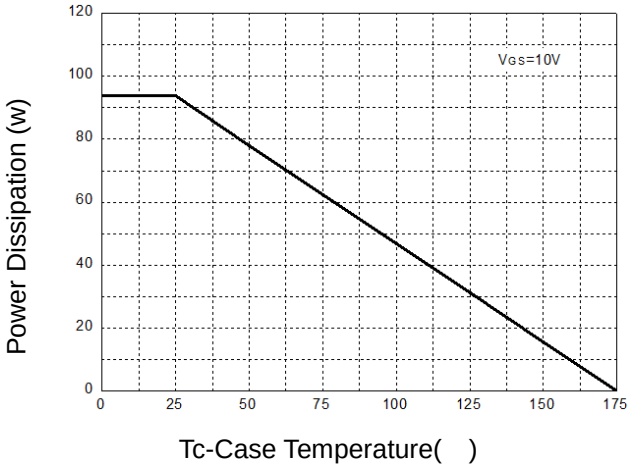


Figure 2: Drain Current

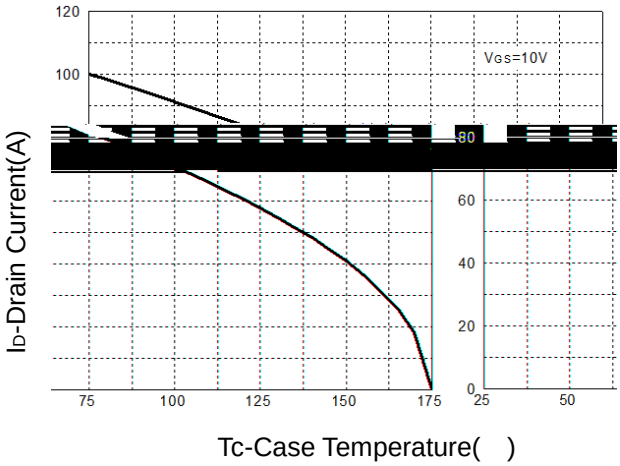


Figure 3: Safe Operation Area

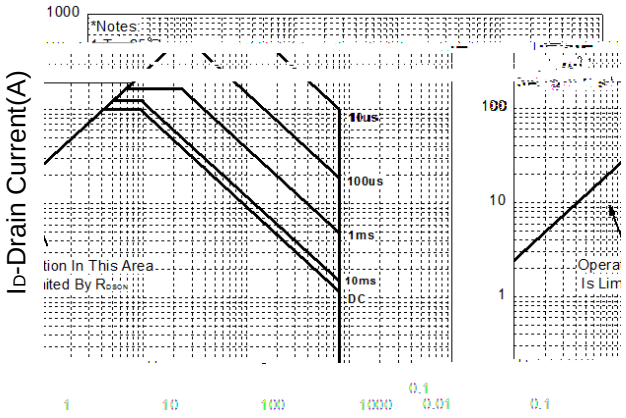


Figure 4: Thermal Transient Impedance

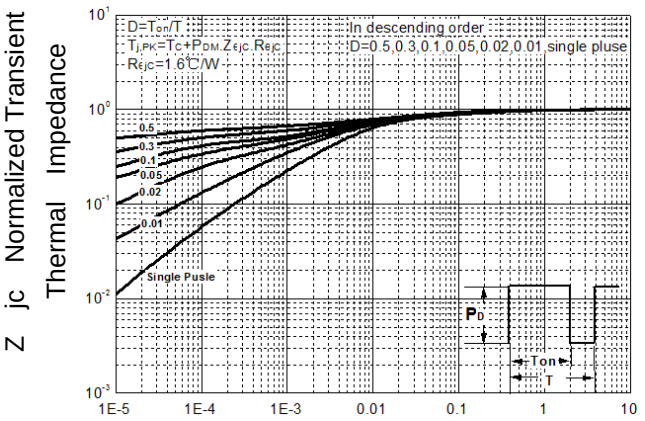


Figure 5: Output Characteristics

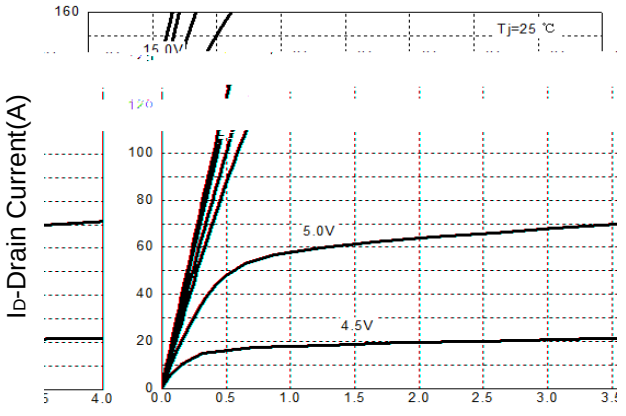
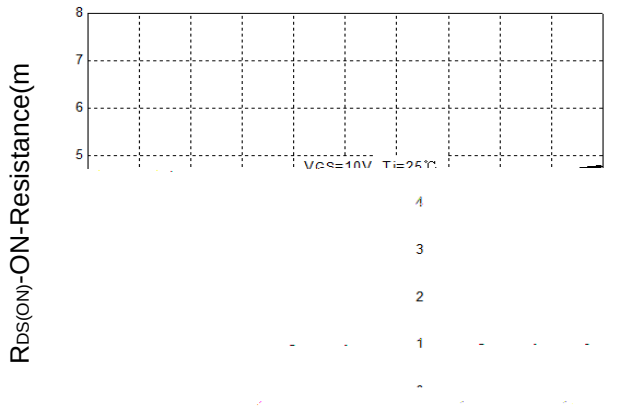
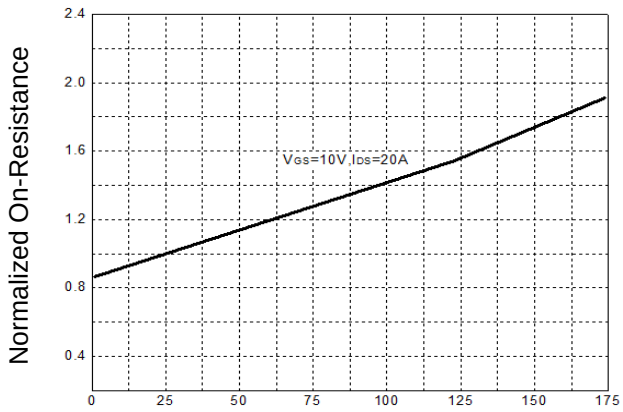


Figure 6: Drain-Source On Resistance



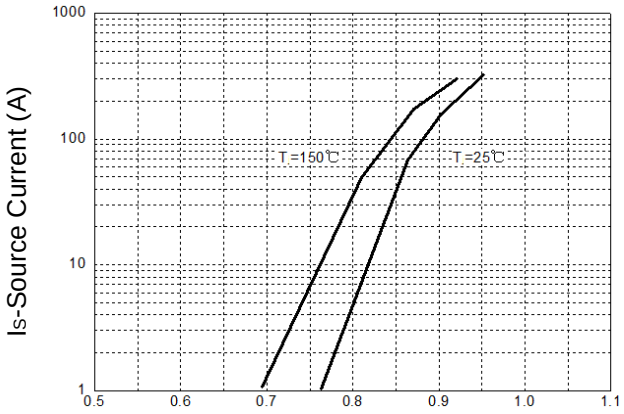
Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature



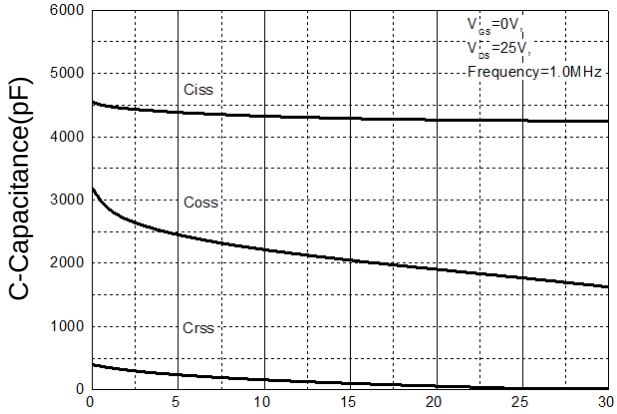
Tj-Junction Temperature ( )

Figure 8: Source-Drain Diode Forward



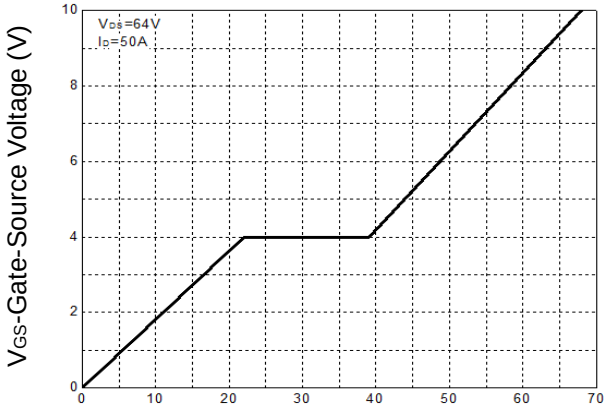
VSD-Source-Drain Voltage(V)

Figure 9: Capacitance Characteristics



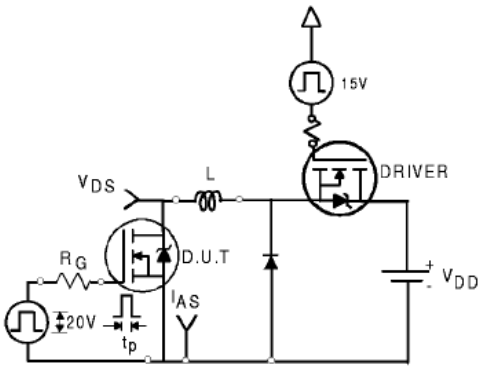
VDS-Drain-Source Voltage (V)

Figure 10: Gate Charge Characteristics

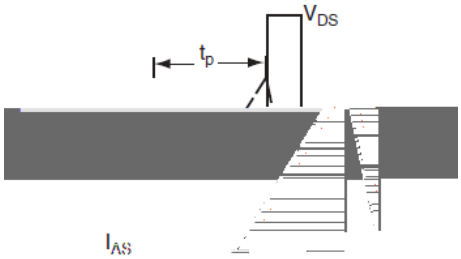


QG-Gate Charge (nC)

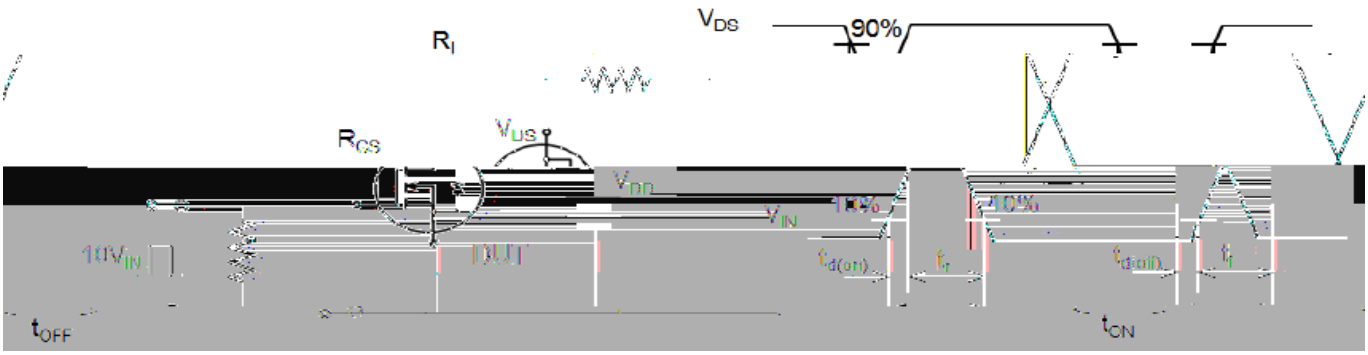
Avalanche Test Circuit



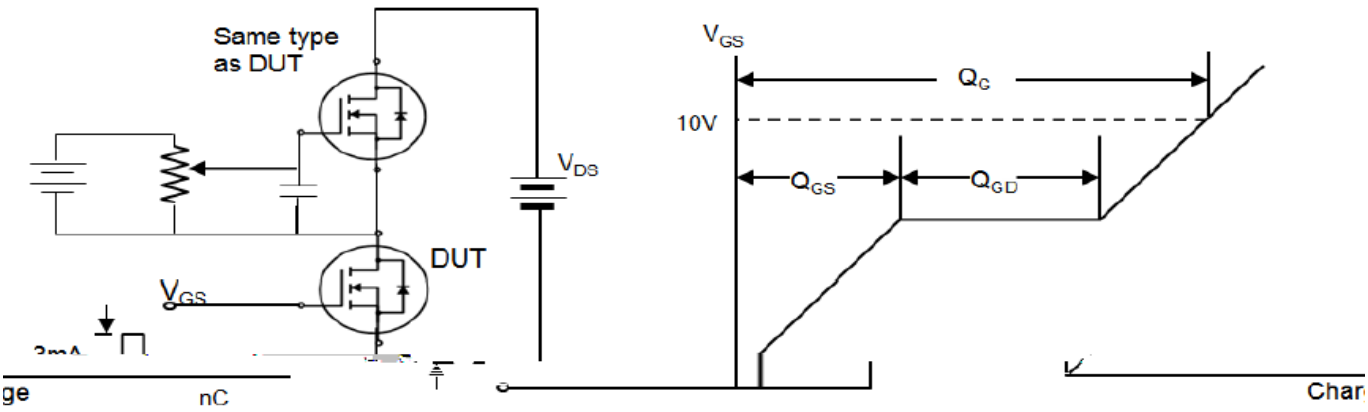
$$E_{AS} = \frac{1}{2} L I_{AS}^2$$



Switching Time Test Circuit



Gate Charge Test Circuit

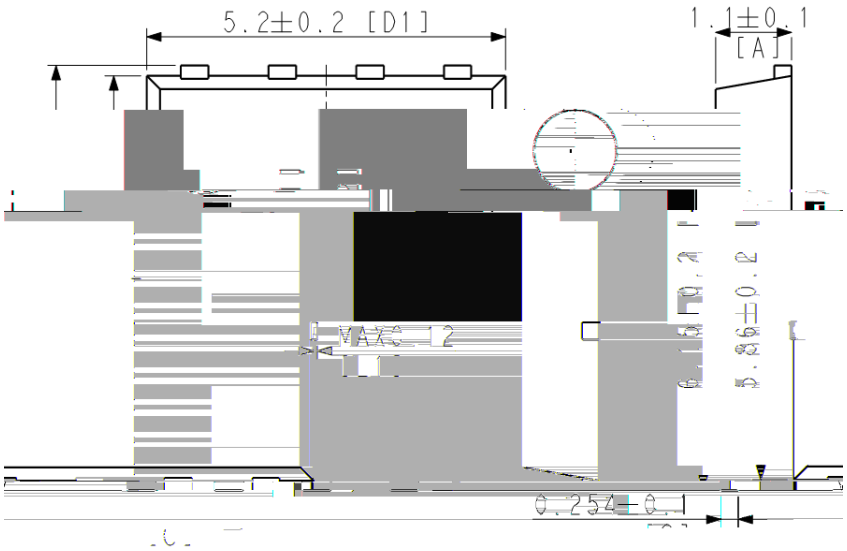


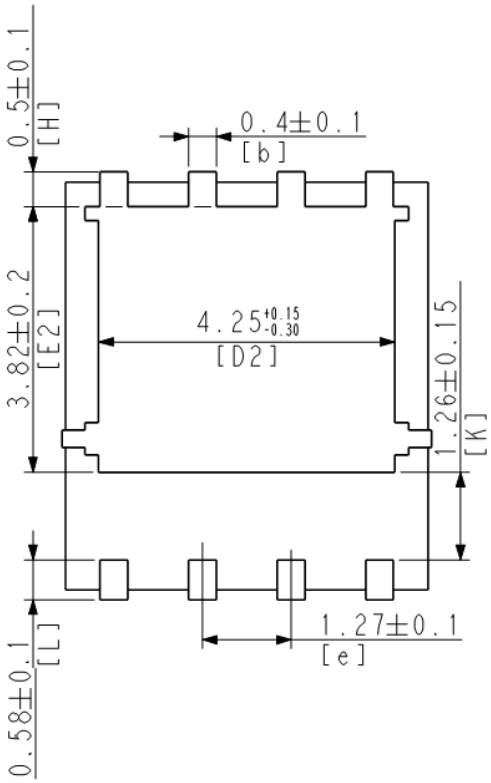
Device Per Unit

Package Type	Unit	Quantity
PPAK5*6-8L	Reel	5000

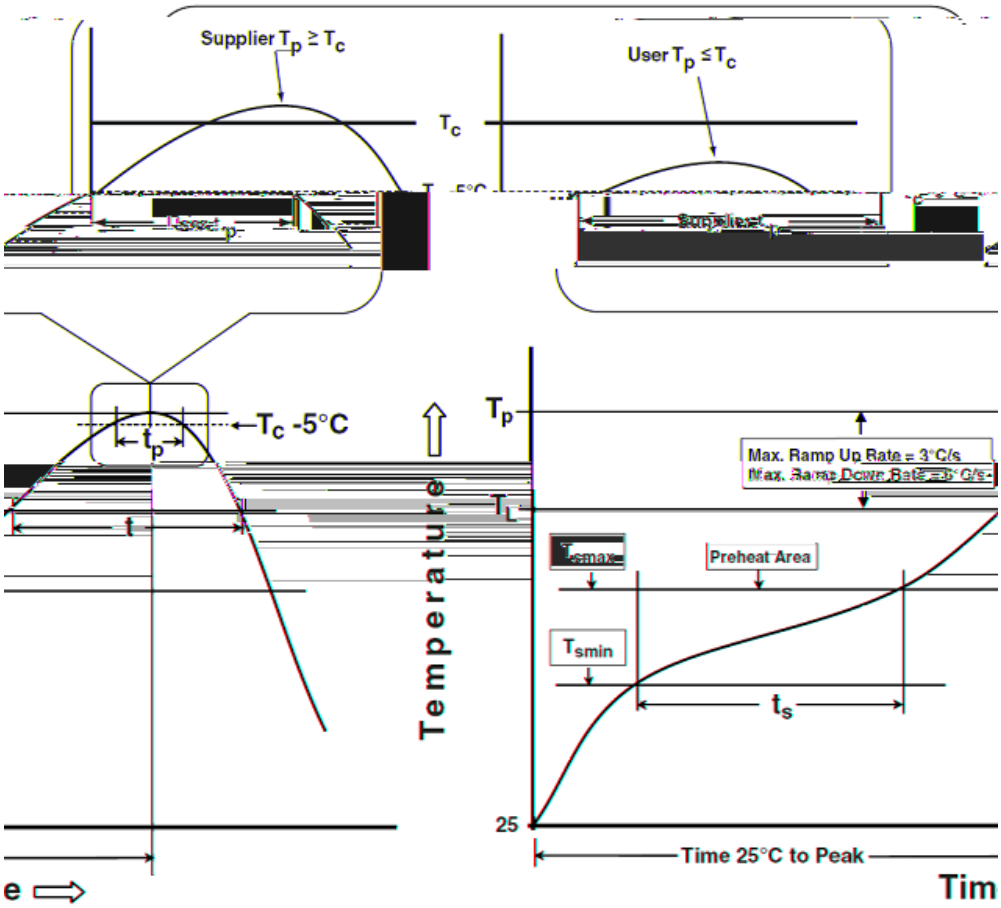
Package Information

PPAK5*6-8L





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 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate ($T_{smax}$to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	SeeClassification Tempin table 2
Time (t_P)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate ($T_p$to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C 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 mm <350	Volume mm 350
2.5 mm	235 °C	220 °C
	220 °C	220 °C

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

Package Thickness	Volume mm <350	Volume mm 350-2000	Volume mm 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
PRECON	JESD-22, A113	30°C/60%/192Hrs