N-Channel Enhancement Mode MOSFET

Feature

- 80V/130A
  $R_{DS(ON)}$= 4 mΩ(typ.)@V_{GS} = 10V
- 100% Avalanche Tested
- Reliable and Rugged
- Lead-Free and Green DevicesAvailable
  (RoHS Compliant)

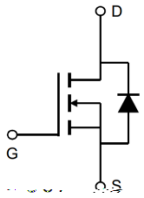
Pin Description

TO-220FB-3L

TO-263-2L

Applications

- Switching application
- Power management for inverter systems
- Motor control



N-Channel MOSFET

Ordering and Marking Information

[redacted] P G050N08 XYMXXXXXX [redacted] B G050N08 XYMXXXXXX	Package Code P :TO-220FB-3L B : TO-263-2L Date Code XYMXXXXXX

Note: HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termi-Nation finish;which are fully compliant with RoHS. HUAYI lead-free products meet or exceed the lead-Free require-ments of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature. HUAYI defines “Green” to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

HUAYI reserves the right to make changes, corrections, enhancements, modifications, and improvements to this pr-oduct and/or to this document at any time without notice.

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	130	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	450	A
I_D	Continuous Drain Current	Tc=25°C	130	A
		Tc=100°C	92	A
P_D	Maximum Power Dissipation	Tc=25°C	187.5	W
		Tc=100°C	93.7	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		0.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		62.5	°C/W
E_{AS}	SinglePulsed-Avalanche Energy ***	L=0.3mH	244	mJ

Note: * Repetitive rating pulse width limited by max.junction temperature.JATE

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	V_{DD}= 40V,R_G=4Ω, I_{DS}= 50A,V_{GS}= 10V	-	17	-	ns
T_r	Turn-on Rise Time		-	87	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	47	-	
T_f	Turn-off Fall Time			101	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS} = 64V, V_{GS}= 10V, I_{DS}= 50A	-	68	-	nC
Q_{gs}	Gate-Source Charge		-	22	-	
Q_{gd}	Gate-Drain Charge		-	17	-	

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

Typical Operating Characteristics

Figure 1: Power Dissipation

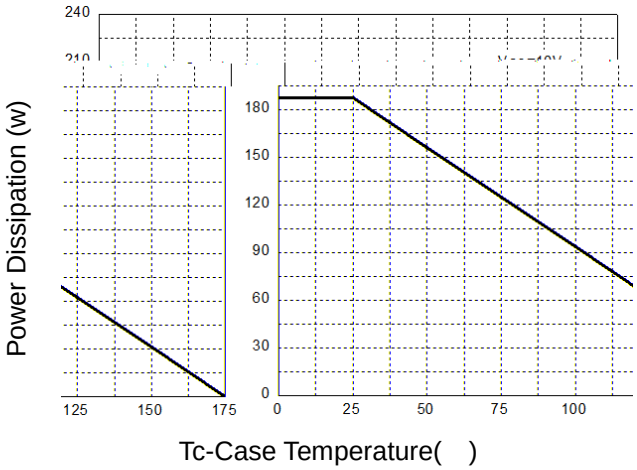


Figure 2: Drain Current

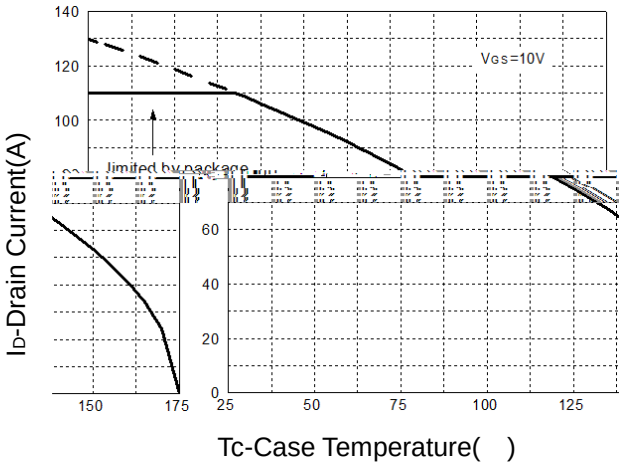


Figure 3: Safe Operation Area

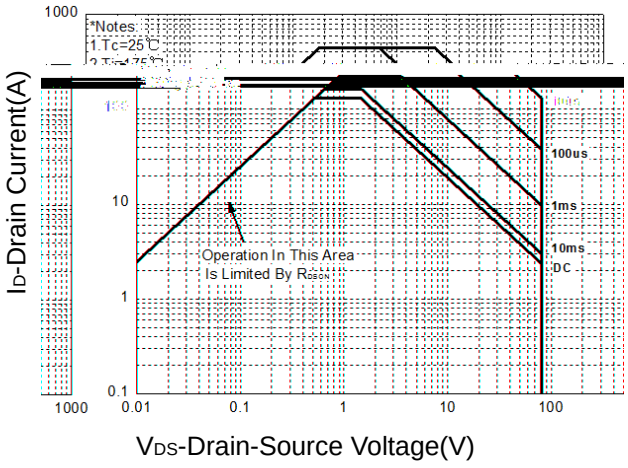


Figure 4: Thermal Transient Impedance

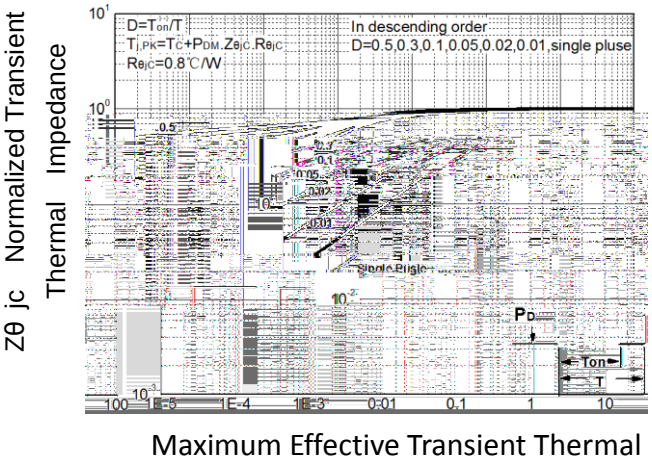


Figure 5: Output Characteristics

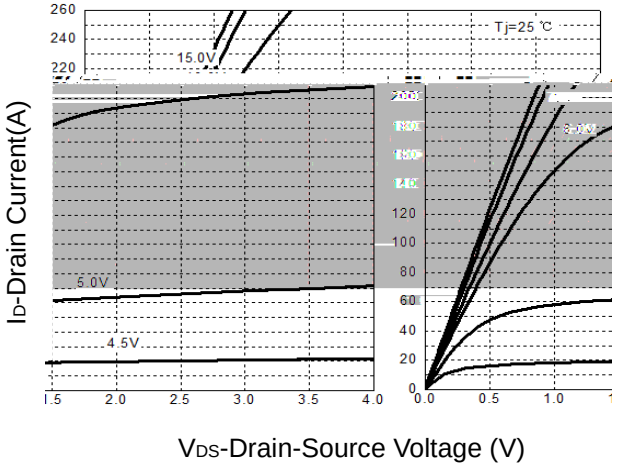
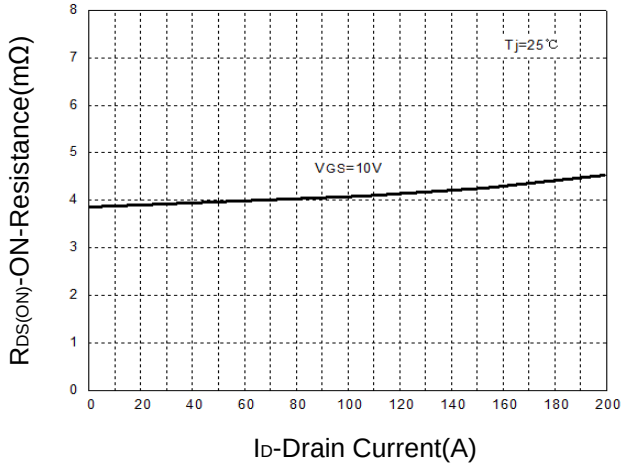
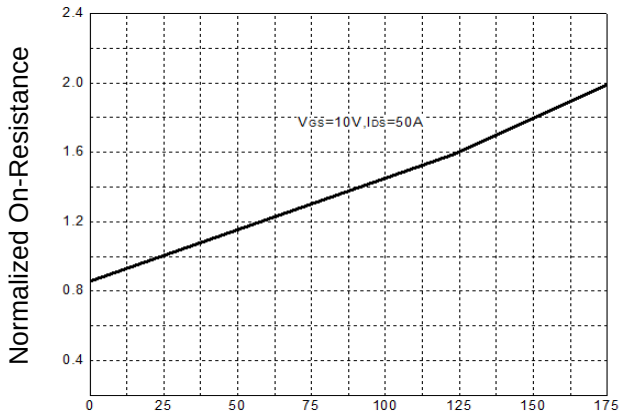


Figure 6: Drain-Source On Resistance



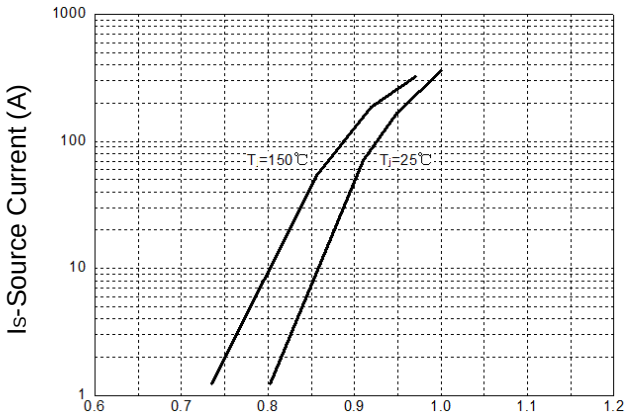
Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature



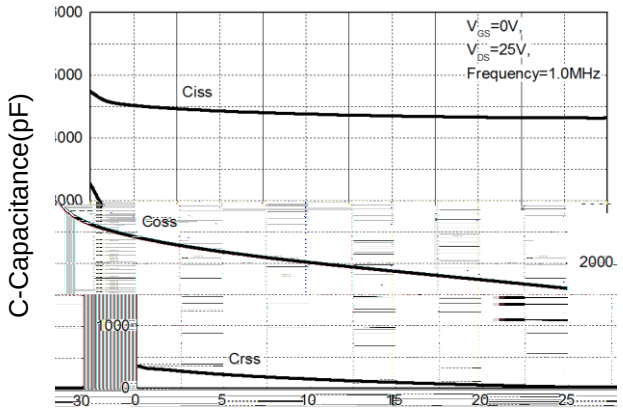
Tj-Junction Temperature ( )

Figure 8: Source-Drain Diode Forward



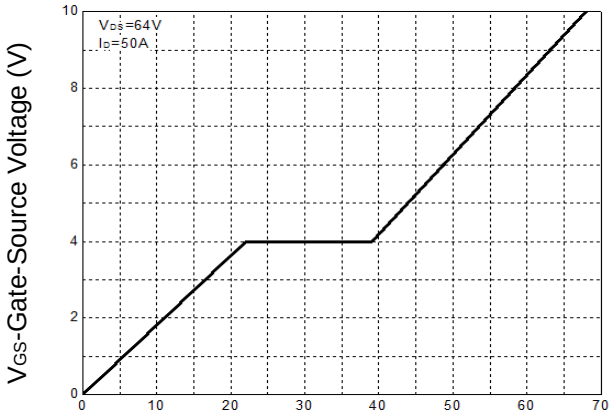
VSD-Source-Drain Voltage(V)

Figure 9: Capacitance Characteristics



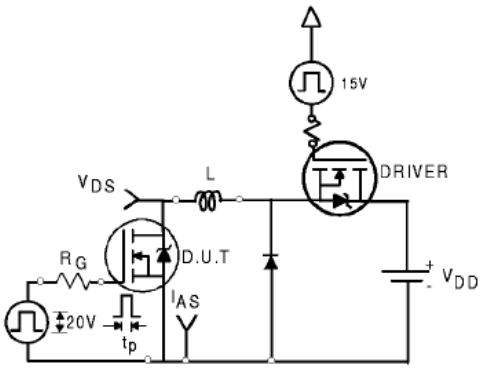
VDS-Drain-Source Voltage (V)

Figure 10: Gate Charge Characteristics

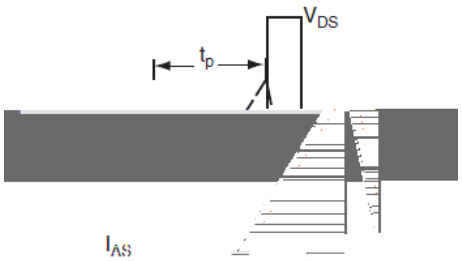


QG-Gate Charge (nC)

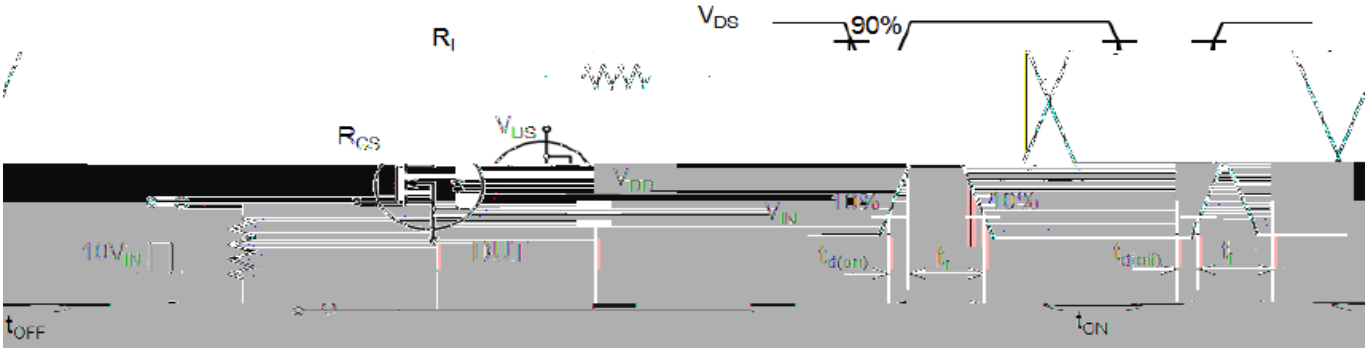
Avalanche Test Circuit



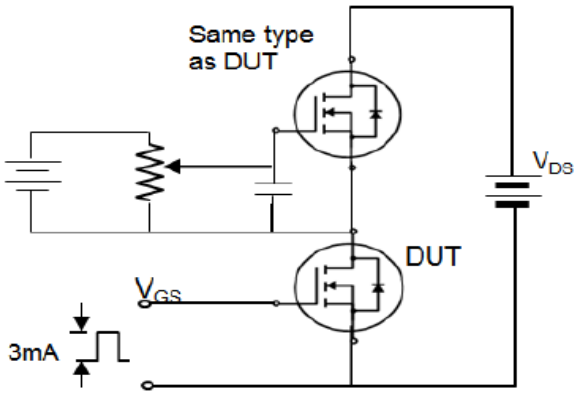
$$E_{AS} = \frac{1}{2} L I_{AS}^2$$

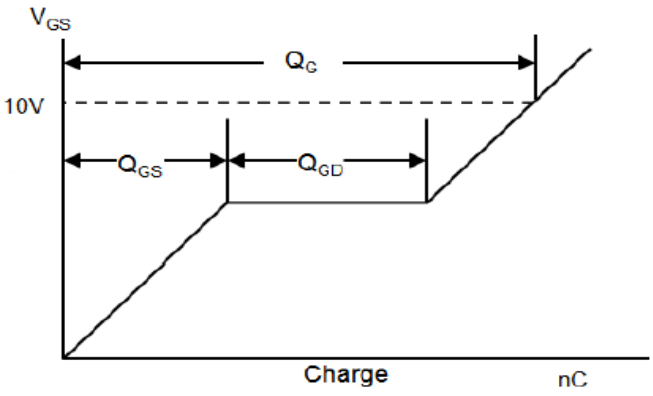


Switching Time Test Circuit



Gate Charge Test Circuit



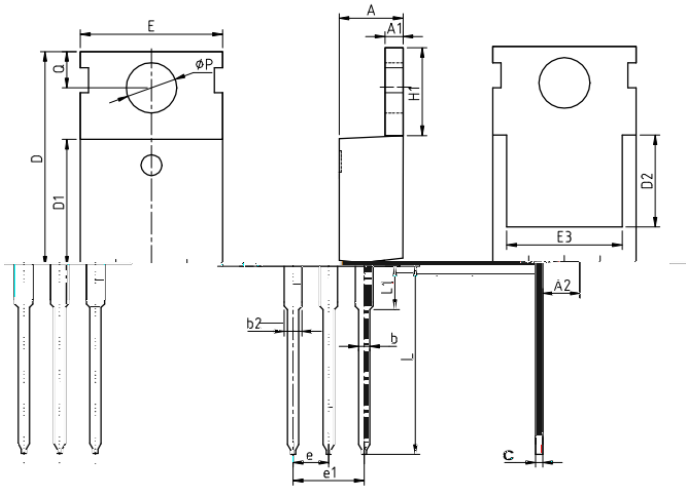


Device Per Unit

Package Type	Unit	Quantity
TO-220FB-3L	Tube	50

Package Information

TO-220FB-3L



COMMON DIMENSIONS

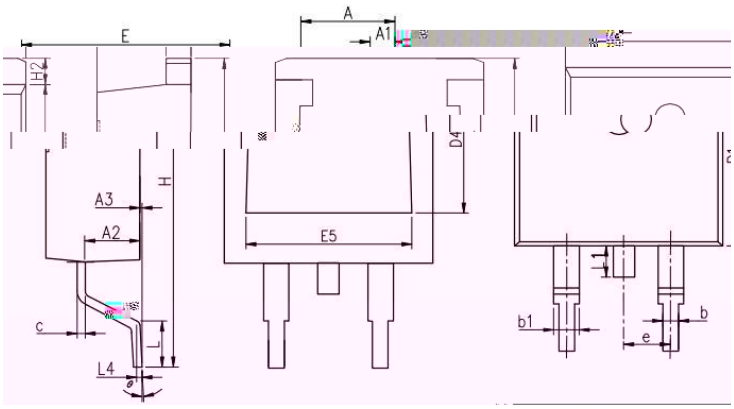
SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

Device Per Unit

Package Type	Unit	Quantity
TO-263-2L	Tube	50

Package Information

TO-263-2L



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9

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	9 60-120 seconds

Volume mm 350
220 °C
220 °C

Volume mm 2000
260 °C
245 °C

cription
0 Hrs, Bias @ 150°C
tm, 121°C
50°C