

HYG170C03LR1C2

30V Complementary MOSFET

Feature

N- Channel

Vds = 30V

20 A (Vgs= 10V)

15 mΩ (Vgs= 10V)

22 mΩ (Vgs= 4.5V)

- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available (RoHS Compliant)

P - Channel

Vds = -30V

- 19 A (Vgs= -10V)

22 mΩ (Vgs= -10V)

40 mΩ (Vgs= -4.5V)

Pin Description

Applications

- Synchronous Rectifiers
- Wireless Power
- H-bridge Motor Drive

Ordering and Marking Information

<p>C2 G170C03 XYMXXXXXX</p>	<p>Package Code C2: PDFN5*6-8L</p> <p>Date Code XYMXXXXXX</p>
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Note:HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plate

Absolute Maximum Ratings

Symbol	Parameter	N- Channel	P- Channel	Unit	
Common Ratings (Tc=25°C Unless Otherwise Noted)					
V _{DSS}	Drain-Source Voltage	30	-30	V	
V _{GSS}	Gate-Source Voltage	±20		V	
T _J	Junction Temperature Range	-55 to 175		°C	
T _{STG}	Storage Temperature Range	-55 to 175		°C	
I _S	Source Current-Continuous(Body Tc=25°C)	20	-19	A	
Mounted on Large Heat Sink					
I _{DM}	Pulsed Drain Current *	Tc=25°C	60	-60	A
I _D	Continuous Drain Current	Tc=25°C	20	-19	A
		Tc=100°C	14	-13.5	A
P _D	Maximum Power Dissipation	Tc=25°C	18.7	25	W
		Tc=100°C	9.3	12.5	W

N-Mosfet Electrical Characteristics (T_c =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG170C03LR1			Unit
			Min	Typ.	Max	
Static Characteristics						
B _{VDS}	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	1.8	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} =10A	-	15	19	m
		V _{GS} =4.5V, I _{DS} =8A	-	22	28	
Diode Characteristics						
V _{SD*}	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} =10A, dI _{SD} /dt=100A/	-	6	-	ns
Q _{rr}	Reverse Recovery Charge		-	2	-	nC

N-Mosfet Electrical Characteristics (Cont.) (T_c =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG170C03LR1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Frequency=1.0MHz	-	1.2	-	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, Frequency=1.0MHz	-	446	-	pF
C _{oss}	Output Capacitance		-	55.1	-	
C _{rss}	Reverse Transfer Capacitance		-	44.2	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _G =2.5 I _{DS} =10A, V _{GS} =10V	-	6	-	ns
T _r	Turn-on Rise Time		-	32	-	
t _{d(OFF)}	Turn-off Delay Time		-	11	-	
T _f	Turn-off Fall Time		-	2.7	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge (V _{GS} =10V,)	V _{DS} =24V, I _D =10A	-	9.2	-	nC
Q _g	Total Gate Charge (V _{GS} =4.5V)		-	4.6	-	
Q _{gs}	Gate-Source Charge		-	1.9	-	
Q _{gd}	Gate-Drain Charge		-	2.3	-	

N-Mosfet Typical Operating Characteristics

Figure 1: Power Dissipation

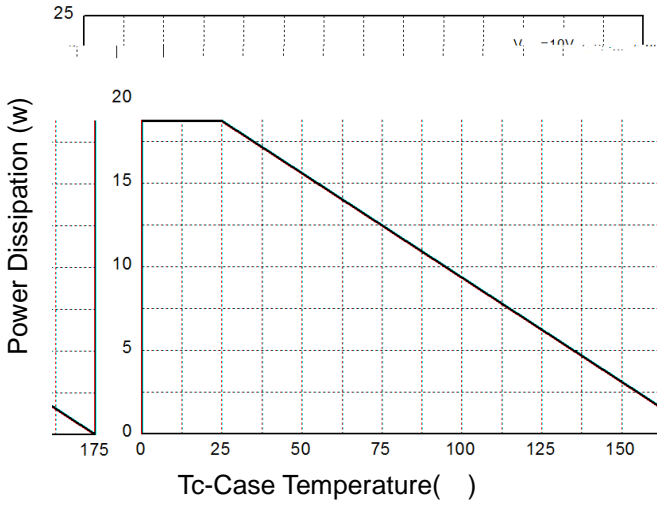


Figure 2: Drain Current

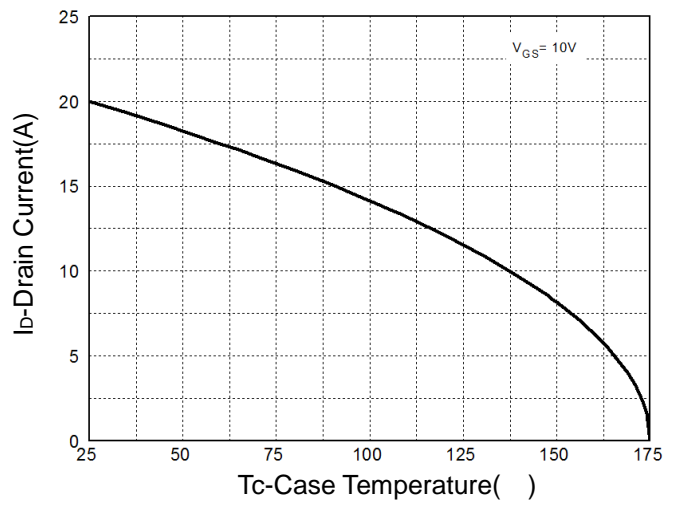


Figure 3: Safe Operation Area

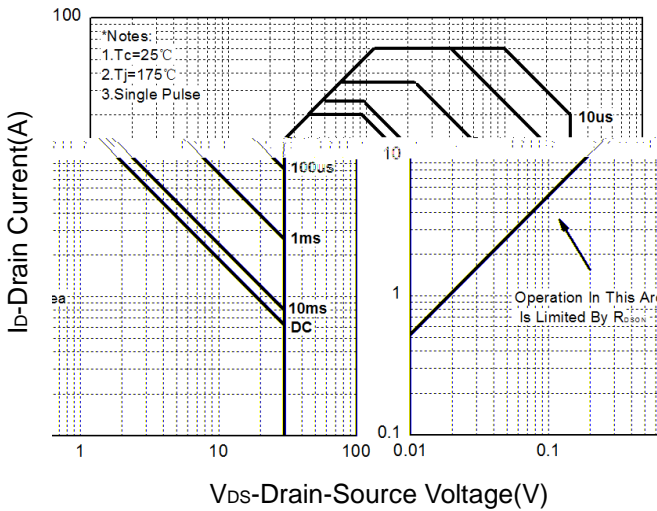


Figure 4: Thermal Transient Impedance

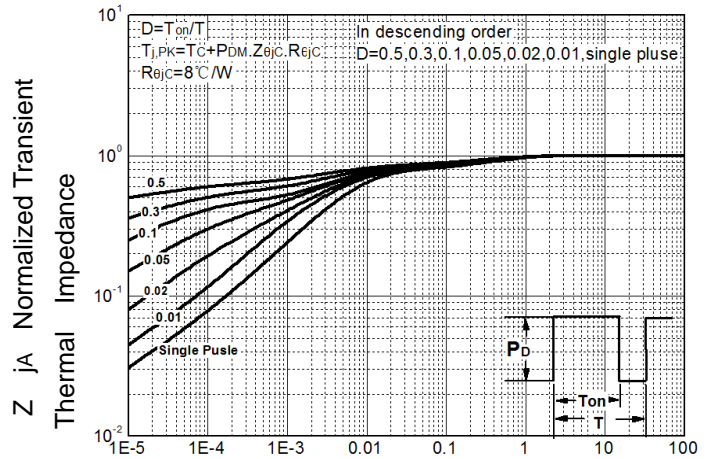


Figure 5: Output Characteristics

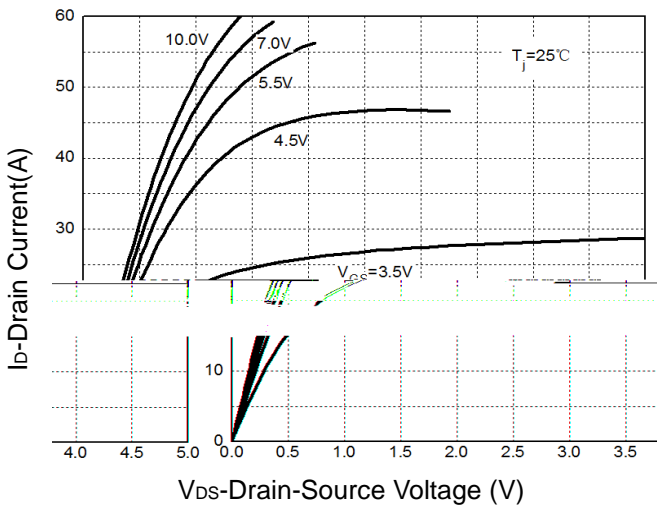
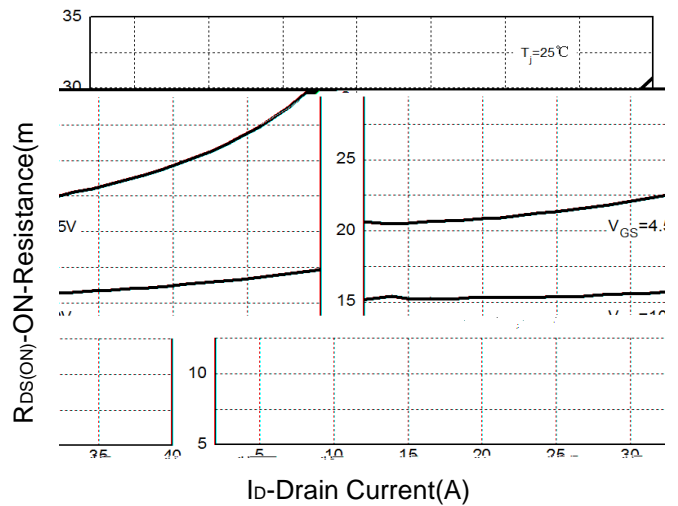


Figure 6: Drain-Source On Resistance



N-Mosfet Typical Operating Characteristics

Figure 7: On-Resistance vs. Temperature

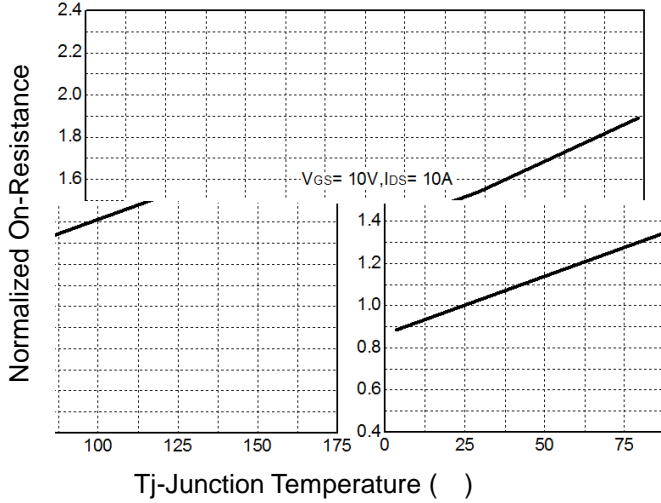


Figure 8: Source-Drain Diode Forward

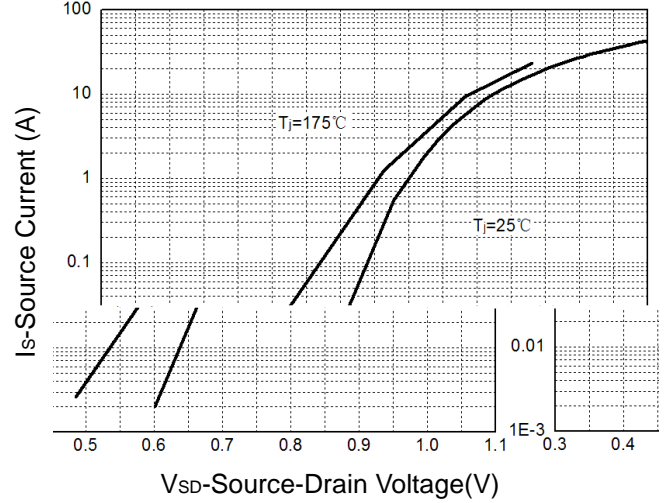


Figure 9: Capacitance Characteristics

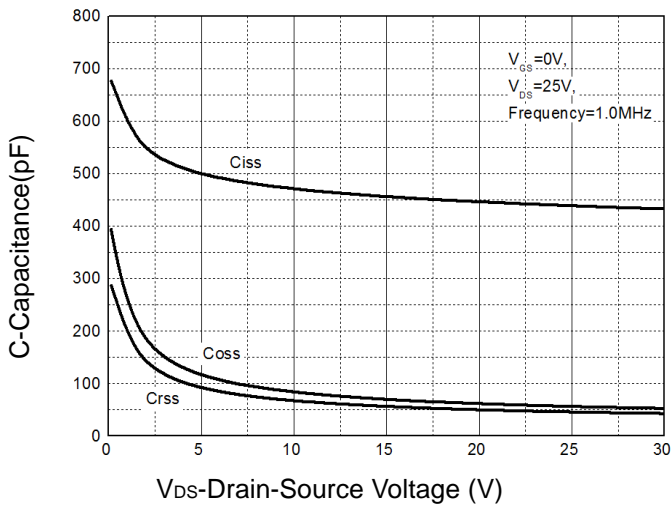
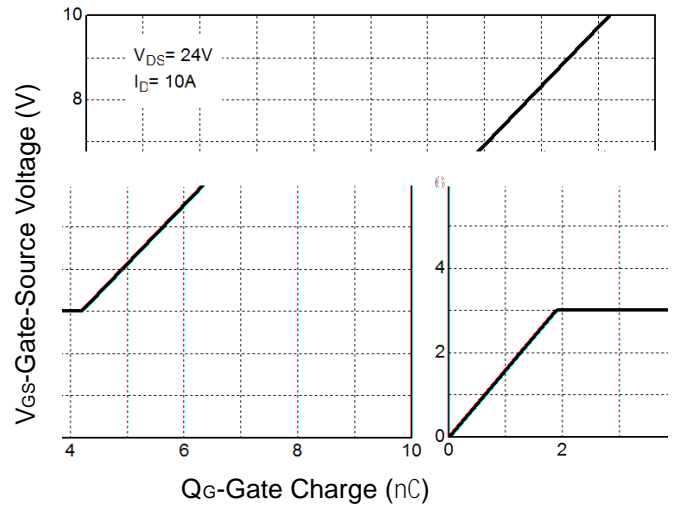
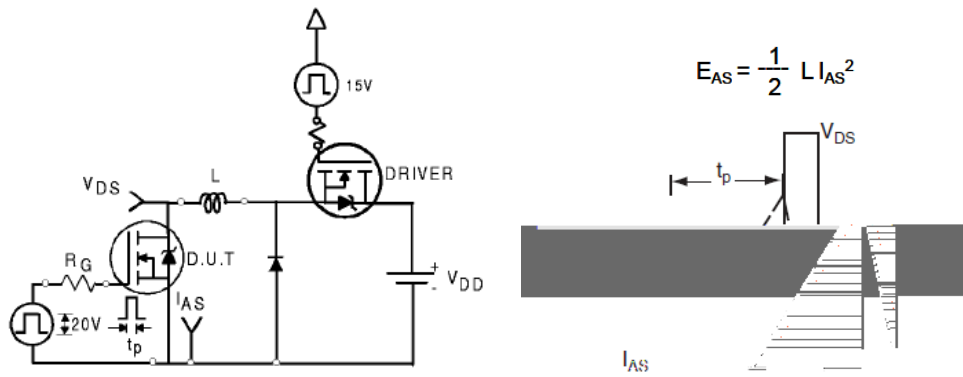


Figure 10: Gate Charge Characteristics

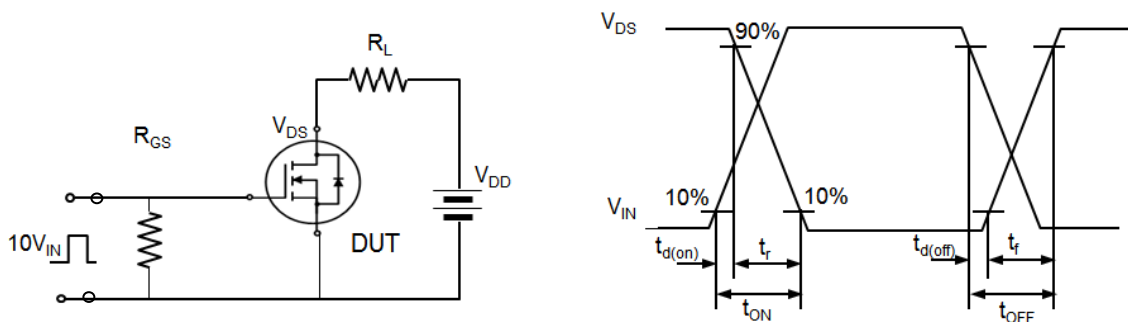


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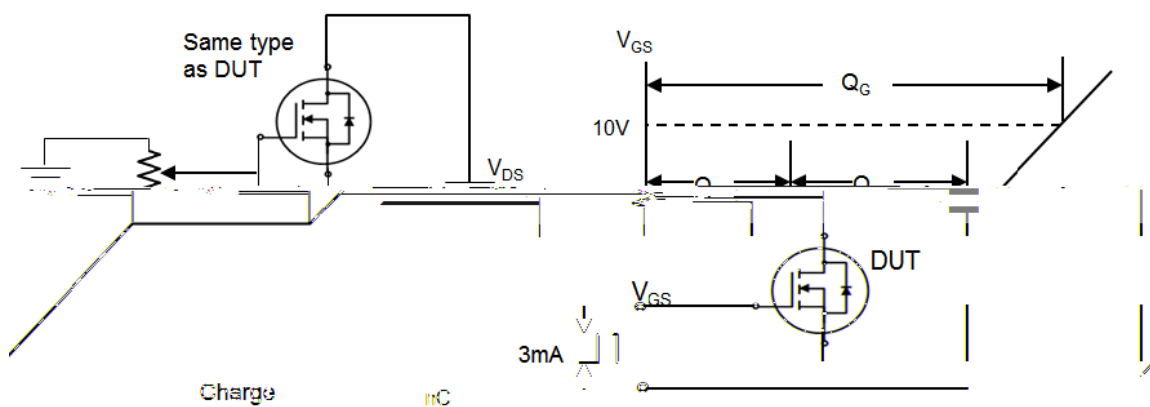
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



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P-Mosfet Electrical Characteristics (T_C = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG170C03LR1			Unit
			Min	Typ.	Max	
Static Characteristics						
B _{VDS}	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	-1.9	-3	V
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} *	Drain-Source	GSSO				

P-Mosfet Typical Operating Characteristics

Figure 1: Power Dissipation

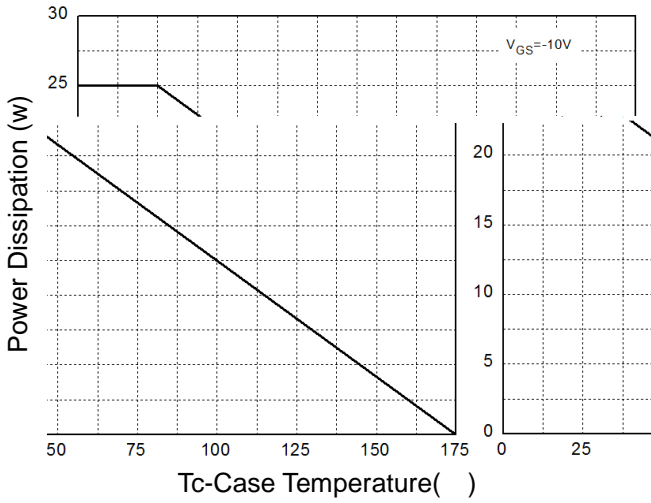


Figure 2: Drain Current

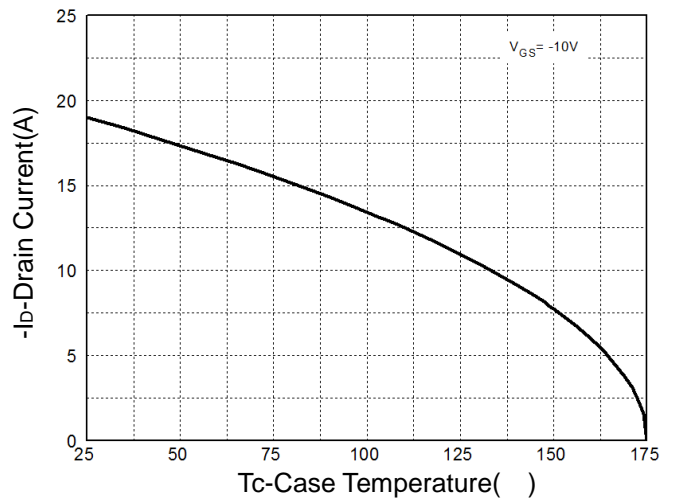


Figure 3: Safe Operation Area

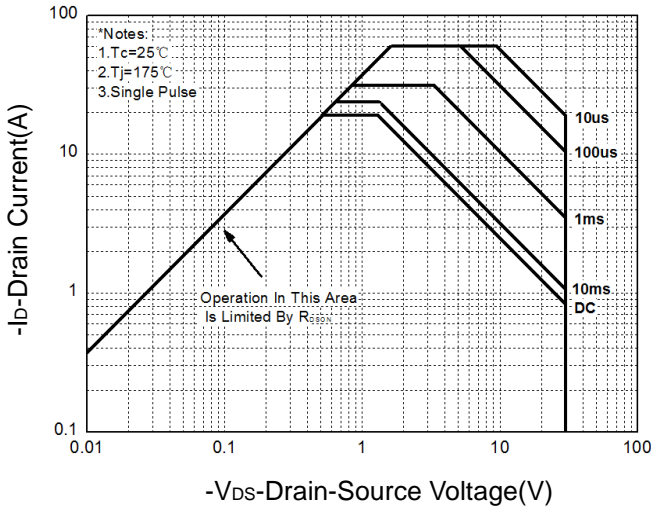


Figure 4: Thermal Transient Impedance

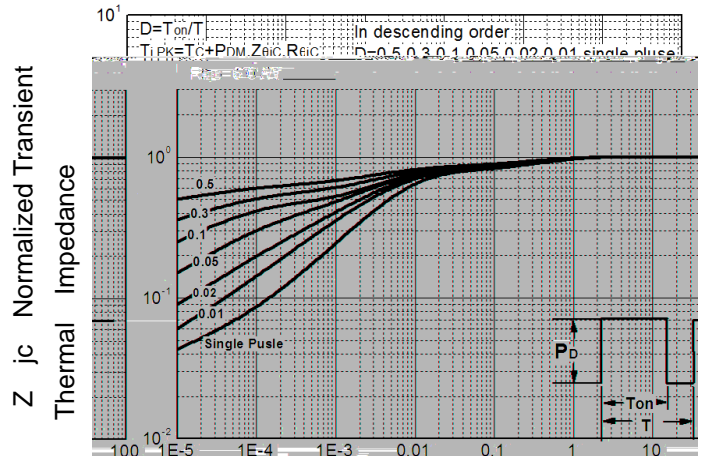


Figure 5: Output Characteristics

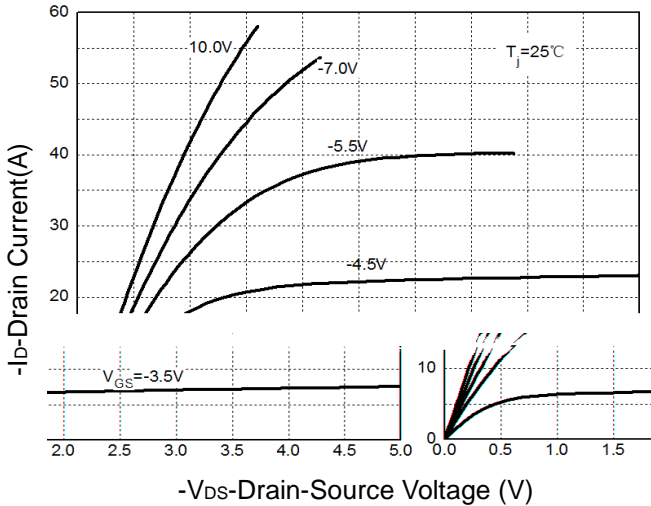
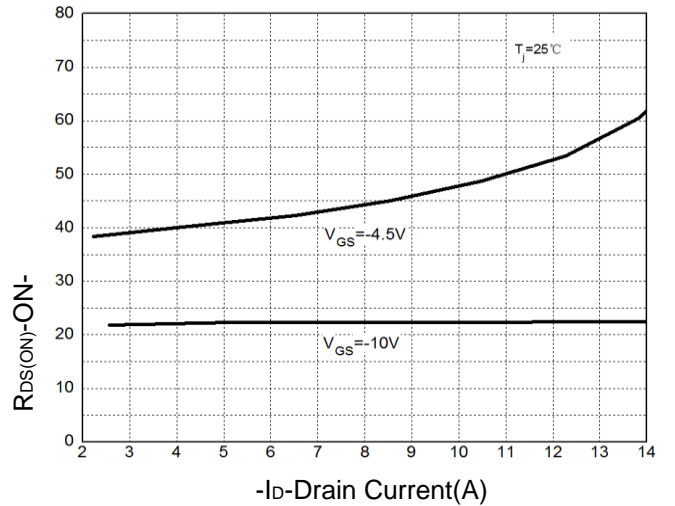


Figure 6: Drain-Source On Resistance



P-Mosfet Typical Operating Characteristics

Figure 7: On-Resistance vs. Temperature

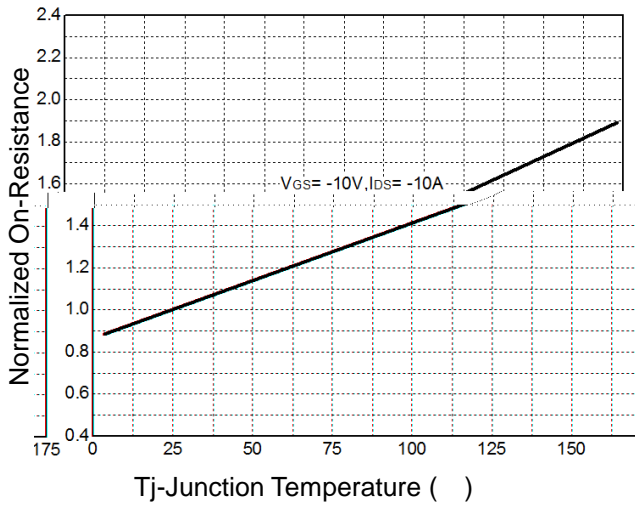


Figure 8: Source-Drain Diode Forward

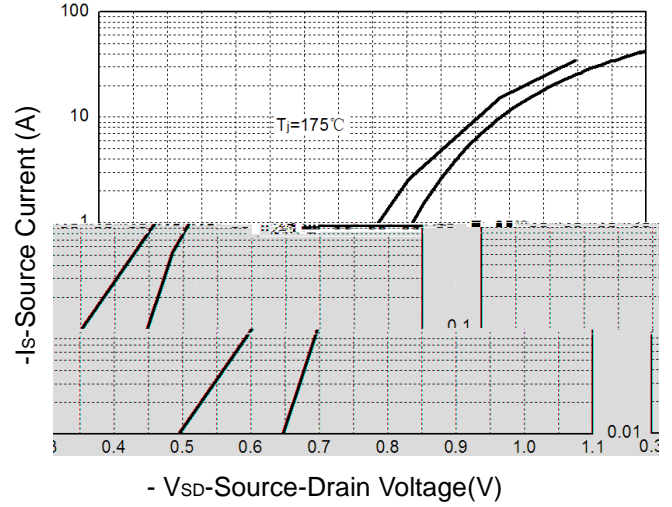


Figure 9: Capacitance Characteristics

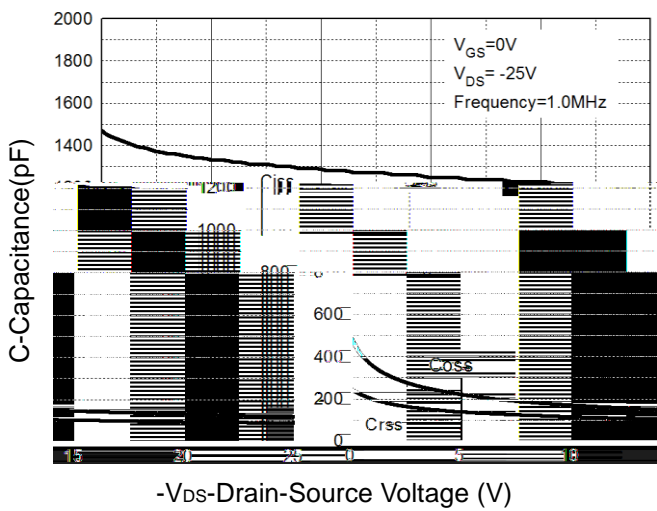
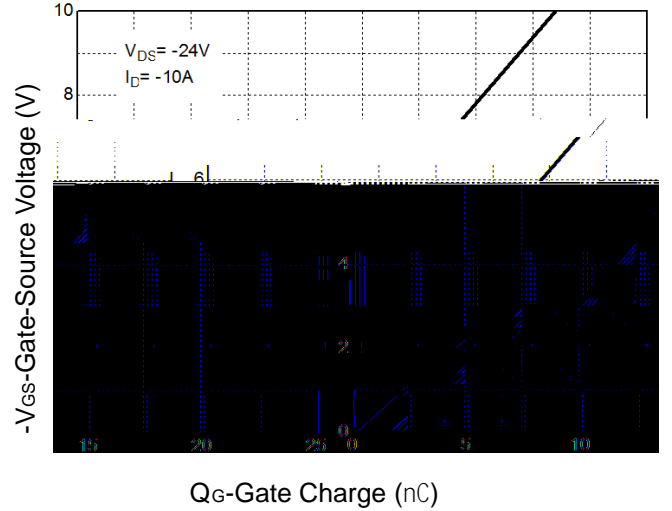
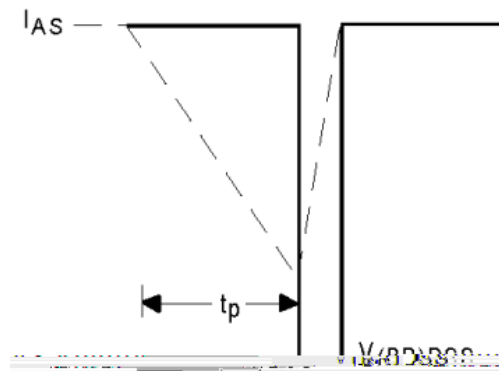
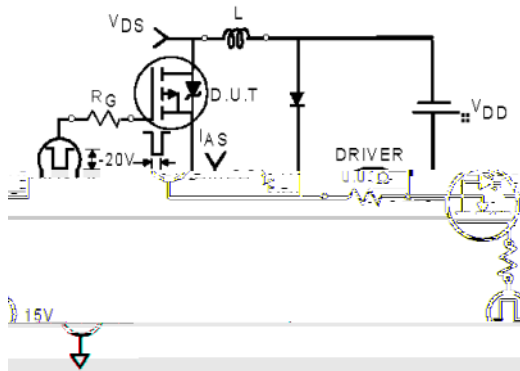


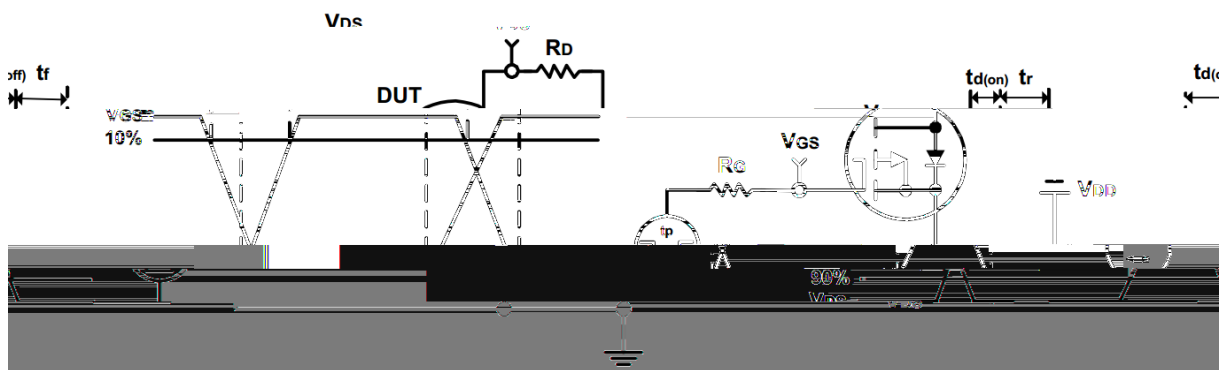
Figure 10: Gate Charge Characteristics



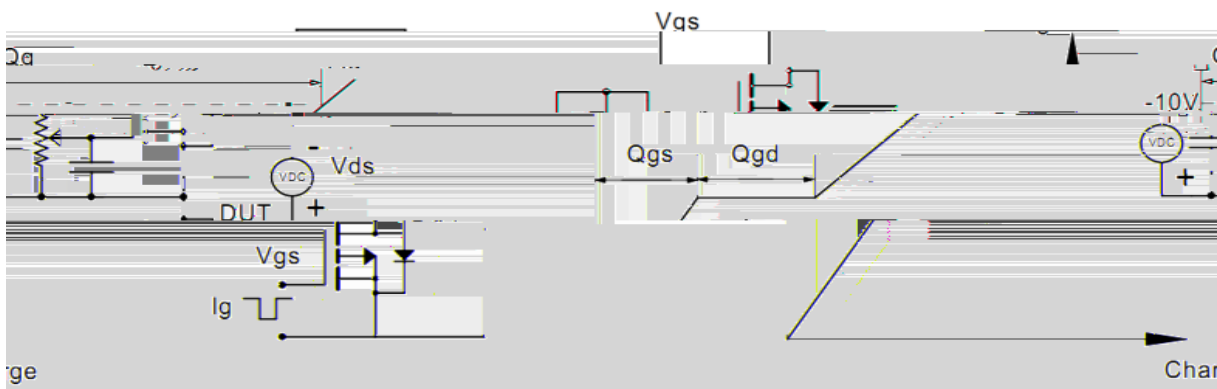
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



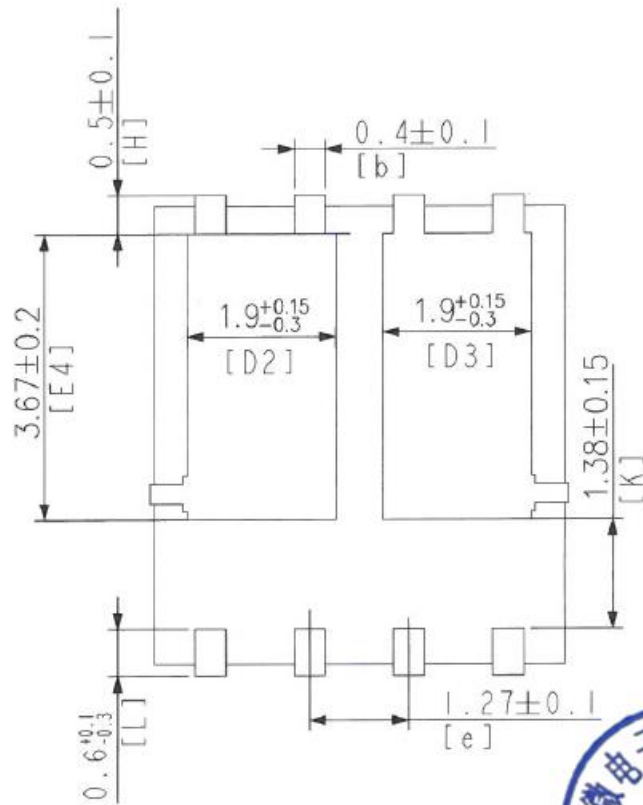
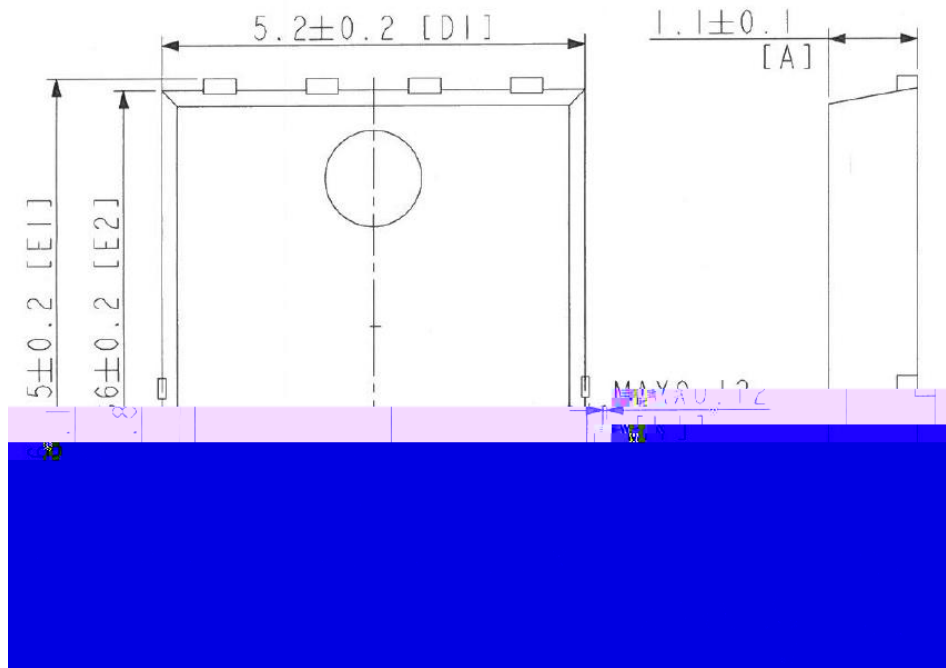
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Device Per Unit

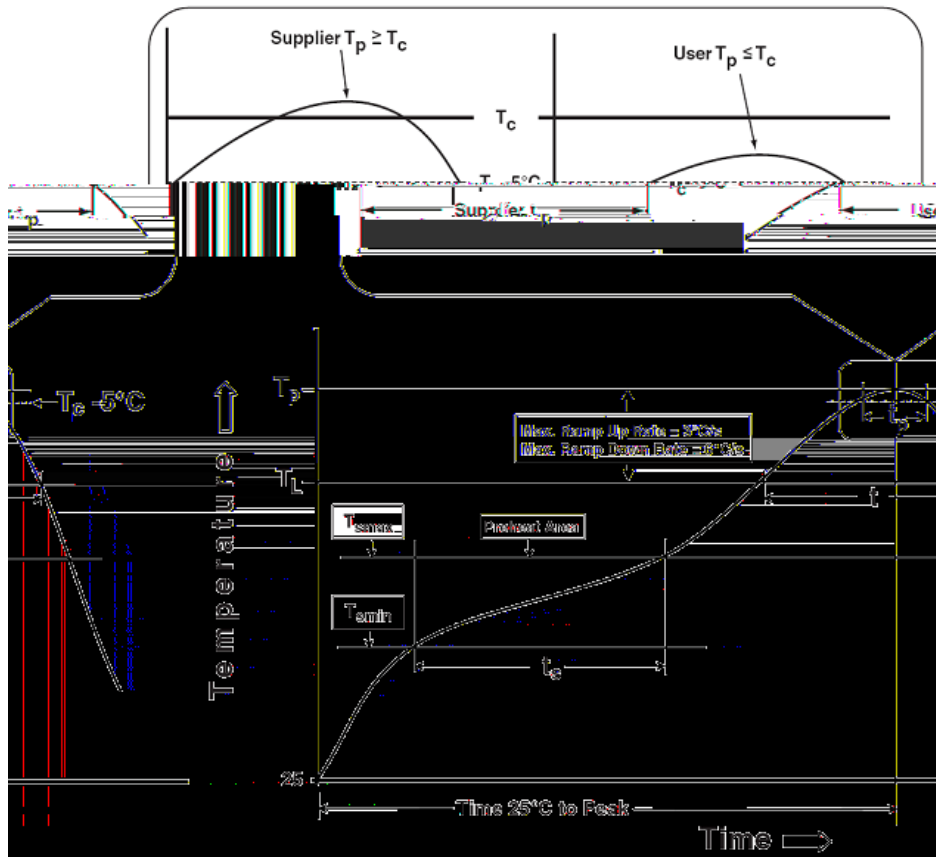
Package Type	Unit	Quantity
PDFN5*6-8L	Reel	5000

Package Information

PDFN5*6-8L



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 (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	See Classification Temp in 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.		

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Table 1.SnPb Eutectic Process Classification Temperatures (Tc)

Package Thickness	Volume mm ³ <350	Volume mm ³ 350
2.5 mm	235 °C	220 °C
	220 °C	220 °C

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

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ 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 Hrs \ 500Hrs\ 1000 Hrs, Bias @ 125°C
HTRB	JESD-22, A108	168 Hrs \ 500Hrs\ 1000 Hrs, Bias @ 125°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C

Customer Service

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