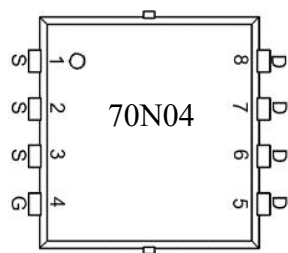


**Features**

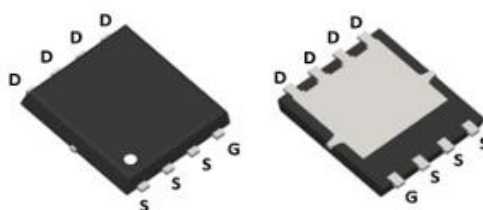
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

 B_{vds} **40V** **R_{dson}** **4.3mΩ** **I_D** **70A****Application**

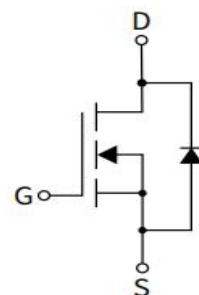
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

RoHS**Package**

Marking and pin assignment



PDFN5x6-8L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
70N04	HLS70N04F	PDFN5x6-8L	5000

Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS}@10V^1$	I_D	70	A
		38	
Pulsed Drain Current ²	I_{DM}	240	A
Single Pulsed Avalanche Energy ³	EAS	45	mJ
Avalanche Current	I_{AS}	15	A
Total Power Dissipation ⁴	P_D	35.7	W
Junction Temperature	T_J	-55 ~ 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case ¹	$R_{\theta JC}$	-	3.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient ¹	$R_{\theta JA}$	-	60	$^\circ\text{C/W}$



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HLS70N04F	PDFN5x6-8L	4	5,6,7,8	1,2,3	Tape Reel

Electrical Characteristics (T_J=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
Gate to Body Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	1.7	2.2	V
Static Drain-Source on-Resistance ²	R _{DS(on)}	V _{GS} =10V, I _D =20A	-	4.3	5.6	mΩ
		V _{GS} =4.5V, I _D =10A	-	5.6	7.5	mΩ
Forward Transconductance	g _{fs}	V _{DS} =5V, I _D =5.5A	-	78	-	S
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1MHz	-	1.1	-	Ω
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	-	1150	-	pF
Output Capacitance	C _{oss}		-	265	-	
Reverse Transfer Capacitance	C _{rss}		-	12.5	-	
Total Gate Charge	Q _g	V _{DS} =20V, I _D =20A, V _{GS} =10V	-	18	-	nC
Gate-Source Charge	Q _{gs}		-	3.4	-	
Gate-Drain(“Miller”) Charge	Q _{gd}		-	2.7	-	
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V, I _D =20A, R _G =3Ω, V _{GS} =10V	-	7.7	-	nS
Turn-on Rise Time	t _r		-	1.6	-	
Turn-Off Delay Time	t _{d(off)}		-	17.2	-	
Turn-Off Fall Time	t _f		-	3.1	-	
Continuous Source Current ^{1,4}	I _S	V _G =V _D =0V, Force Current	-	-	70	A
Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
Reverse Recovery Time	T _{rr}	IF=20A, di/dt=100A/us	-	25	-	nS
Reverse Recovery Charge	Q _{rr}		-	6	-	nC

Notes:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
- 3.The EAS data shows Max. rating . The test condition is T_J=25°C , L=0.4mH, I_{AS} = 15A, V_{GS}=10V, V_{DD}=25V.
- 4.The power dissipation is limited by 150°C junction temperature.
- 5.The data is theoretically the same as I_D and I_{DM}, in real applications , should be limited by total power dissipation.



Typical Performance Characteristics

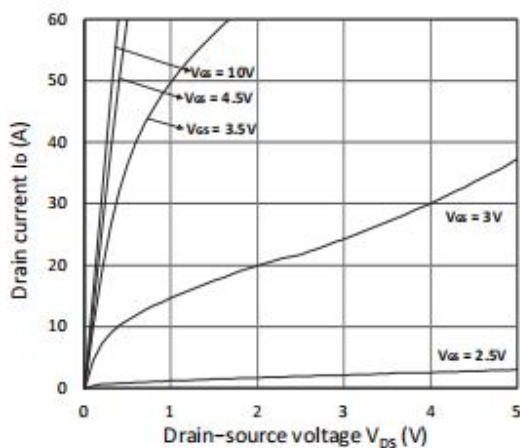


Figure 1. Output Characteristics

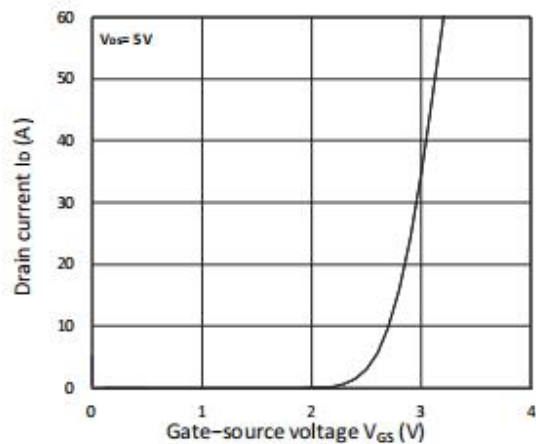


Figure 2. Transfer Characteristics

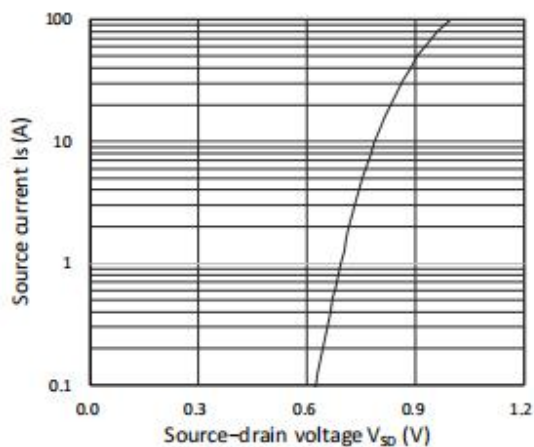
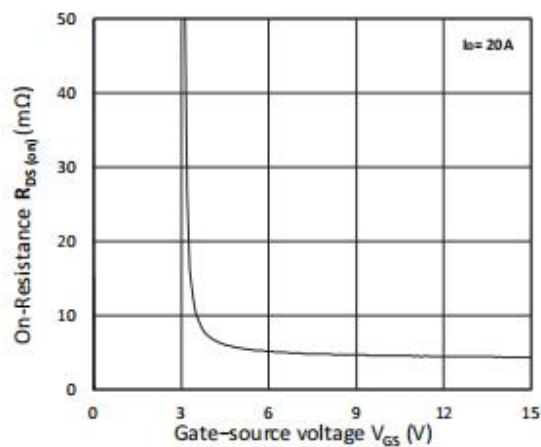
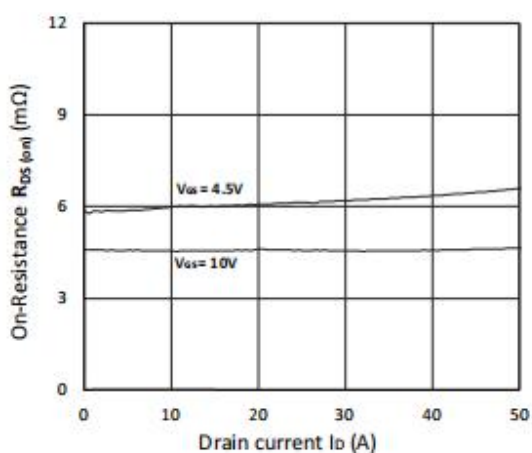
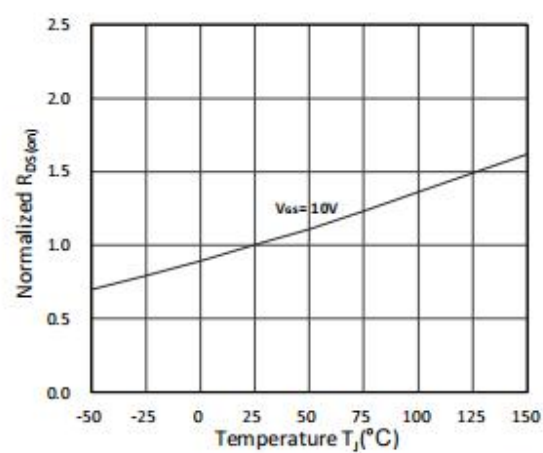


Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(on)}$ vs. V_{GS} Figure 5. $R_{DS(on)}$ vs. I_D Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

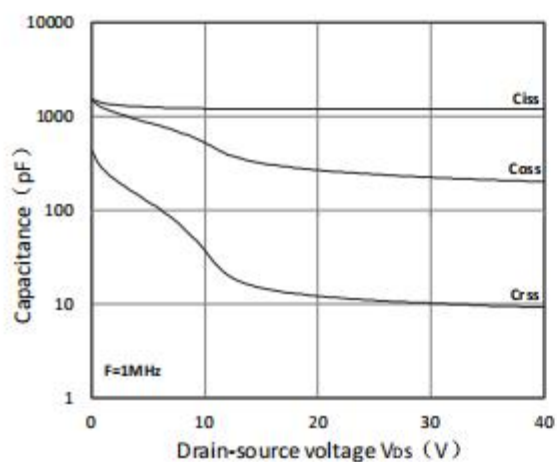


Figure 7. Capacitance Characteristics

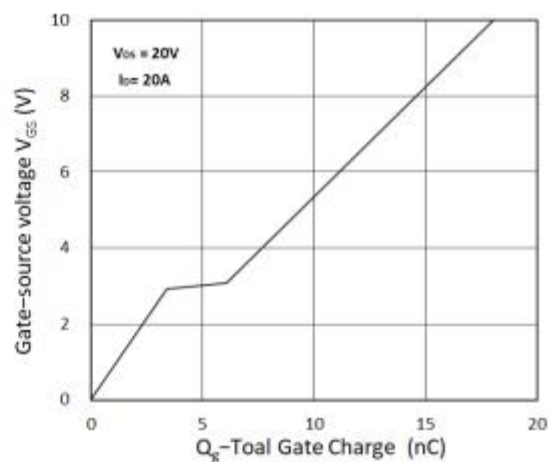


Figure 8. Gate Charge Characteristics

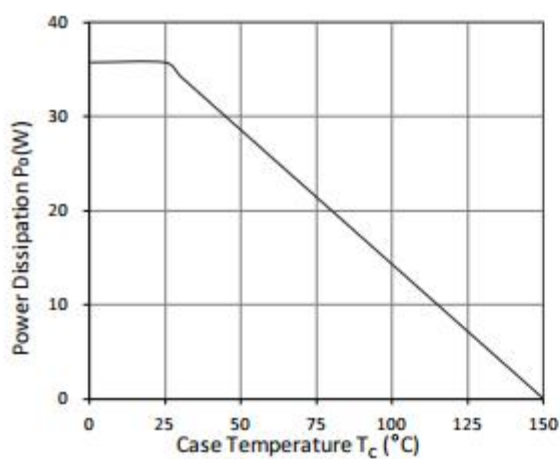


Figure 9. Power Dissipation

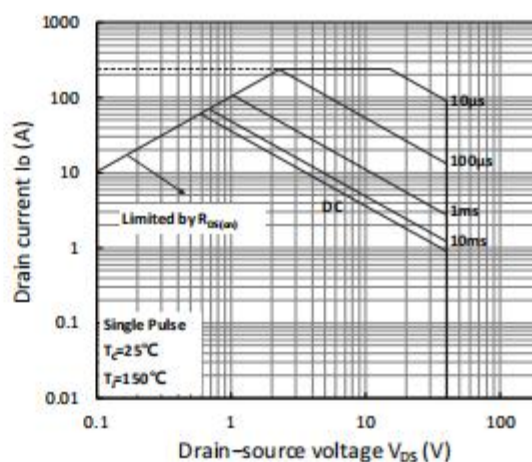


Figure 10. Safe Operating Area

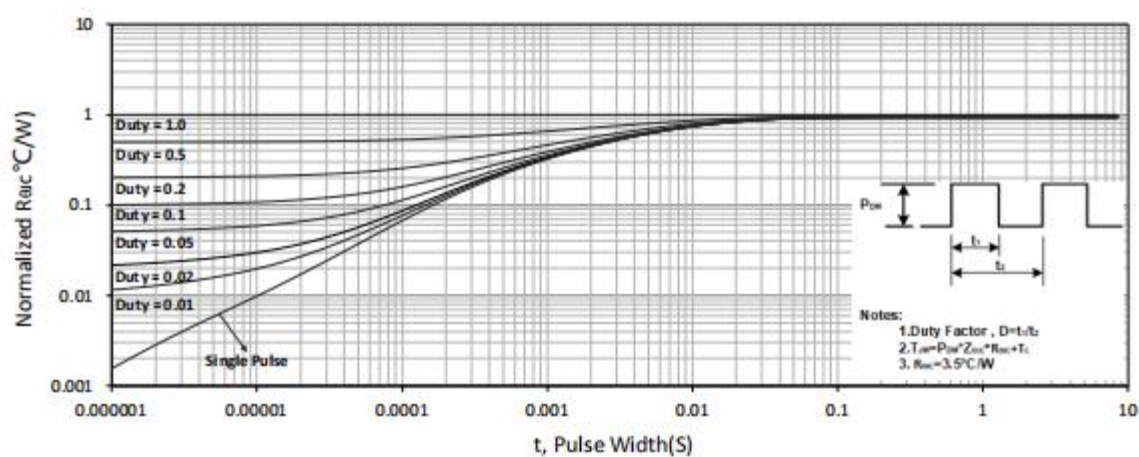
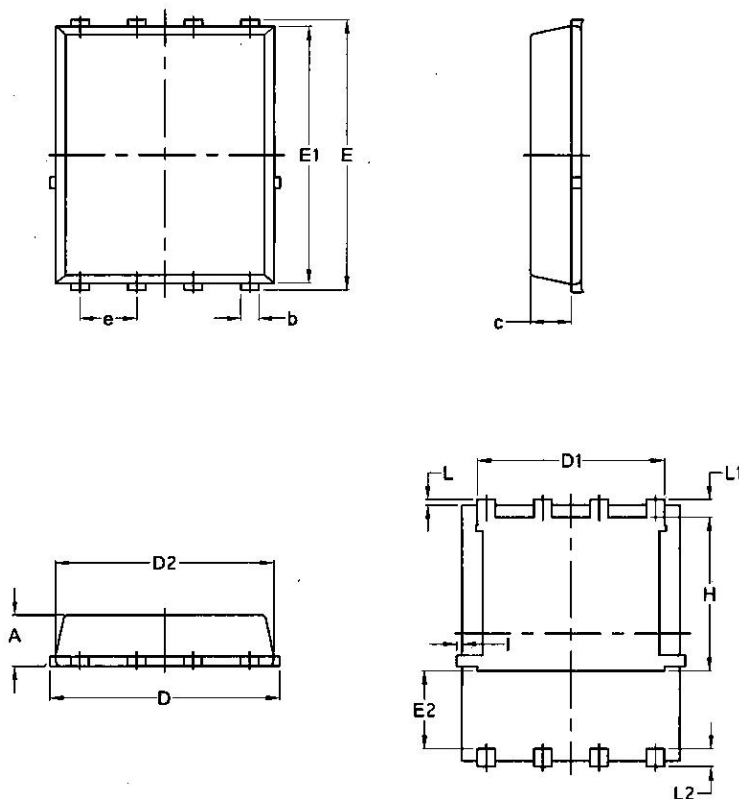


Figure 11. Normalized Maximum Transient Thermal Impedance



Package Dimensions PDFN5x6-8L



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070



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