

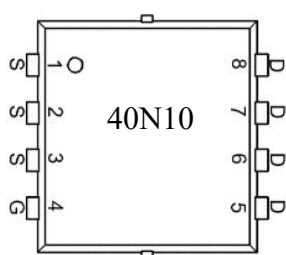
**Features**

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

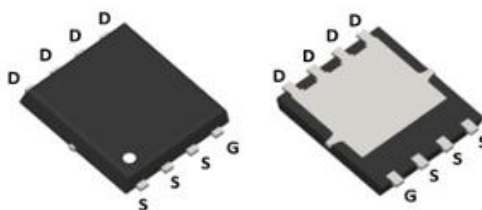
 B_{vds} **100V** **R_{dson}** **9.8mΩ** **I_D** **40A****Application**

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

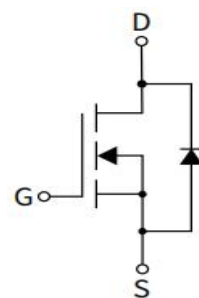
RoHS

Package

Marking and pin assignment



PDFN3x3-8L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
40N10	HLS40N10D	PDFN3x3-8L	5000

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	40	A
		18	A
Pulsed Drain Current ¹	I_{DM}	120	A
Single Pulsed Avalanche Energy ²	E_{AS}	80	mJ
Avalanche Current	I_{AS}	--	A
Power Dissipation	P_D	67	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	$R_{\theta JC}$	--	1.9	$^{\circ}\text{C/W}$
Thermal Resistance,Junction-to-Ambient ³	$R_{\theta JA}$	--	45	$^{\circ}\text{C/W}$

Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free	PDFN3x3-8L	G	D	S	Tape Reel
HLS40N10D		4	5,6,7,8	1,2,3	

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

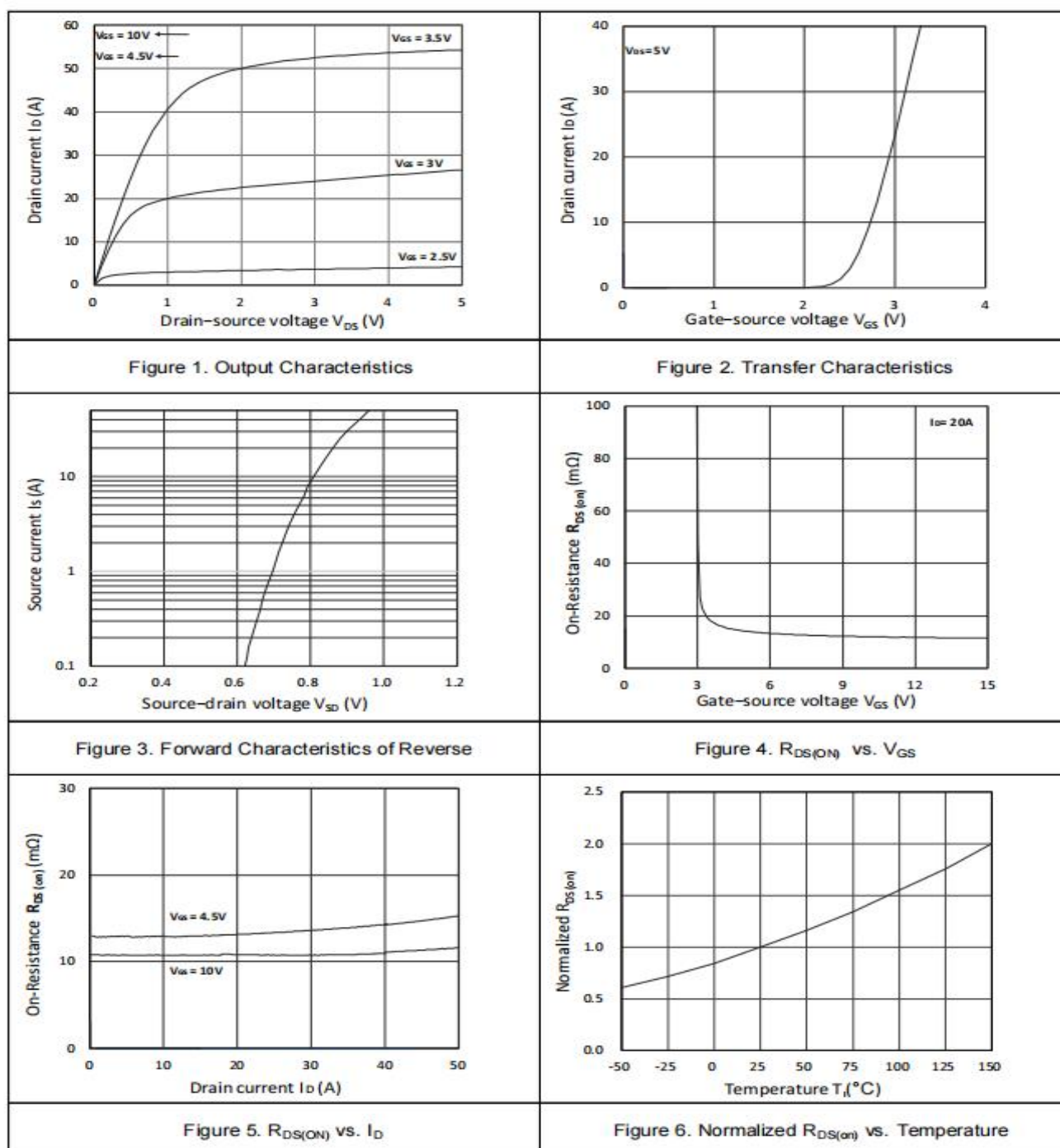
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V, T_J=100^{\circ}\text{C}$	-	-	100	μA
Gate to Body Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.7	2.5	V
Static Drain-Source On-Resistance ⁴	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	9.8	12.5	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	12	16.5	m Ω
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_D=20A$	-	55	-	S
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	-	1.8	-	Ω
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	1210	-	pF
Output Capacitance	C_{oss}		-	144	-	
Reverse Transfer Capacitance	C_{rss}		-	11.5	-	
Total Gate Charge	Q_g	$V_{DS}=50V, V_{GS}=10V,$ $I_D=20A$	-	23	-	nC
Gate-Source Charge	Q_{gs}		-	3	-	
Gate-Drain("Miller") Charge	Q_{gd}		-	5	-	
Turn-on Delay Time	$T_{d(on)}$	$V_{GS}=10V, V_{DD}=50V,$ $R_G=3\Omega, I_D=20A$	-	9.5	-	nS
Turn-on Rise Time	t_r		-	3.8	-	
Turn-Off Delay Time	$T_{d(off)}$		-	25.8	-	
Turn-Off Fall Time	T_f		-	4.5	-	
Maximum Continuous Drain to Source Diode Forward Current	I_S	$V_G=V_D=0V, \text{Force Current}$	-	-	40	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}	--	-	-	-	A
Diode Forward Voltage ⁴	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A, di/dt=100A/\mu s$	-	30	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	42	-	nC



Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^{\circ}\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $L=0.4\text{mH}$, $I_{AS}=20\text{A}$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Performance Characteristics



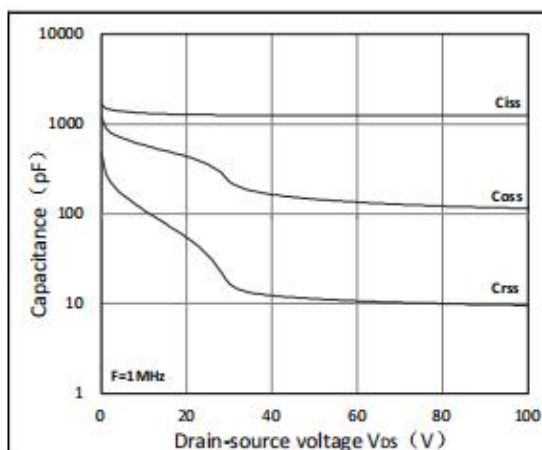


Figure 7. Capacitance Characteristics

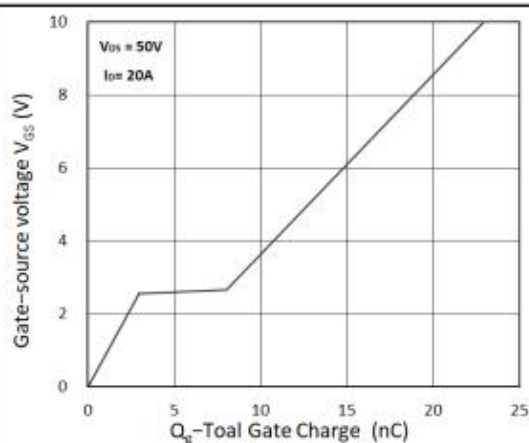


Figure 8. Gate Charge Characteristics

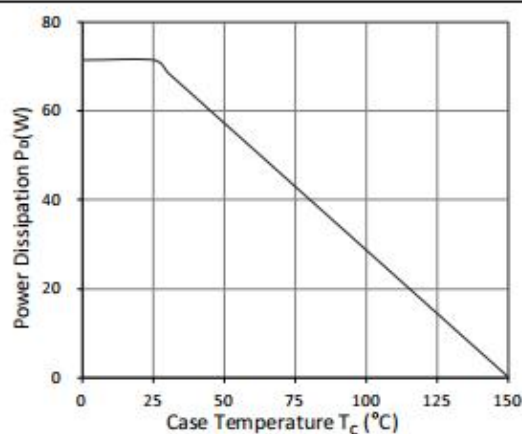


Figure 9. Power Dissipation

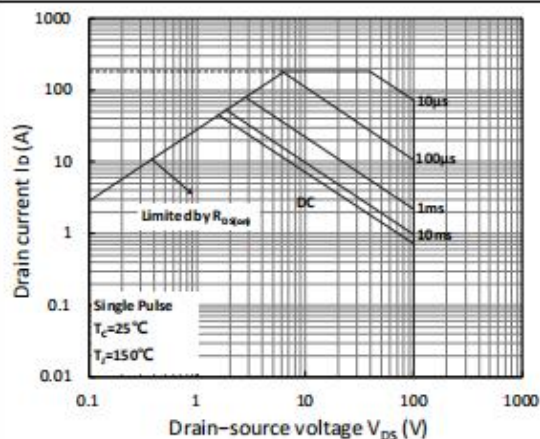


Figure 10. Safe Operating Area

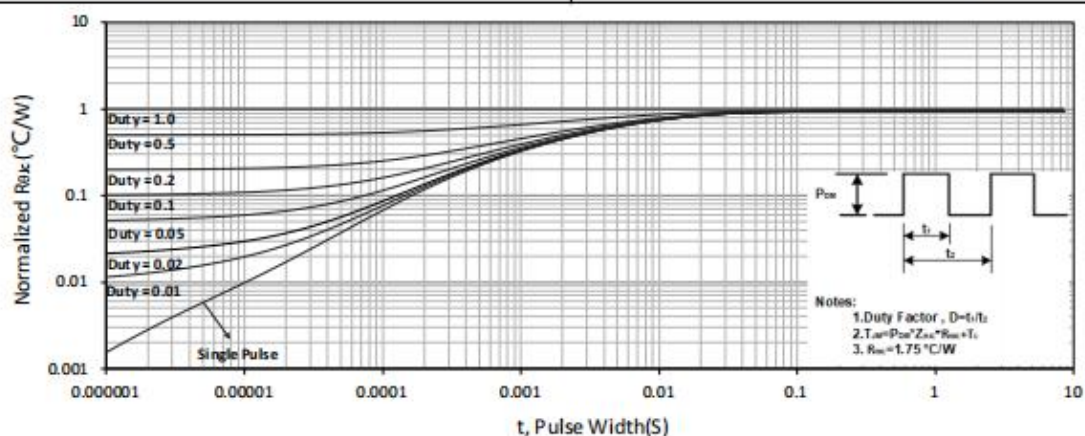
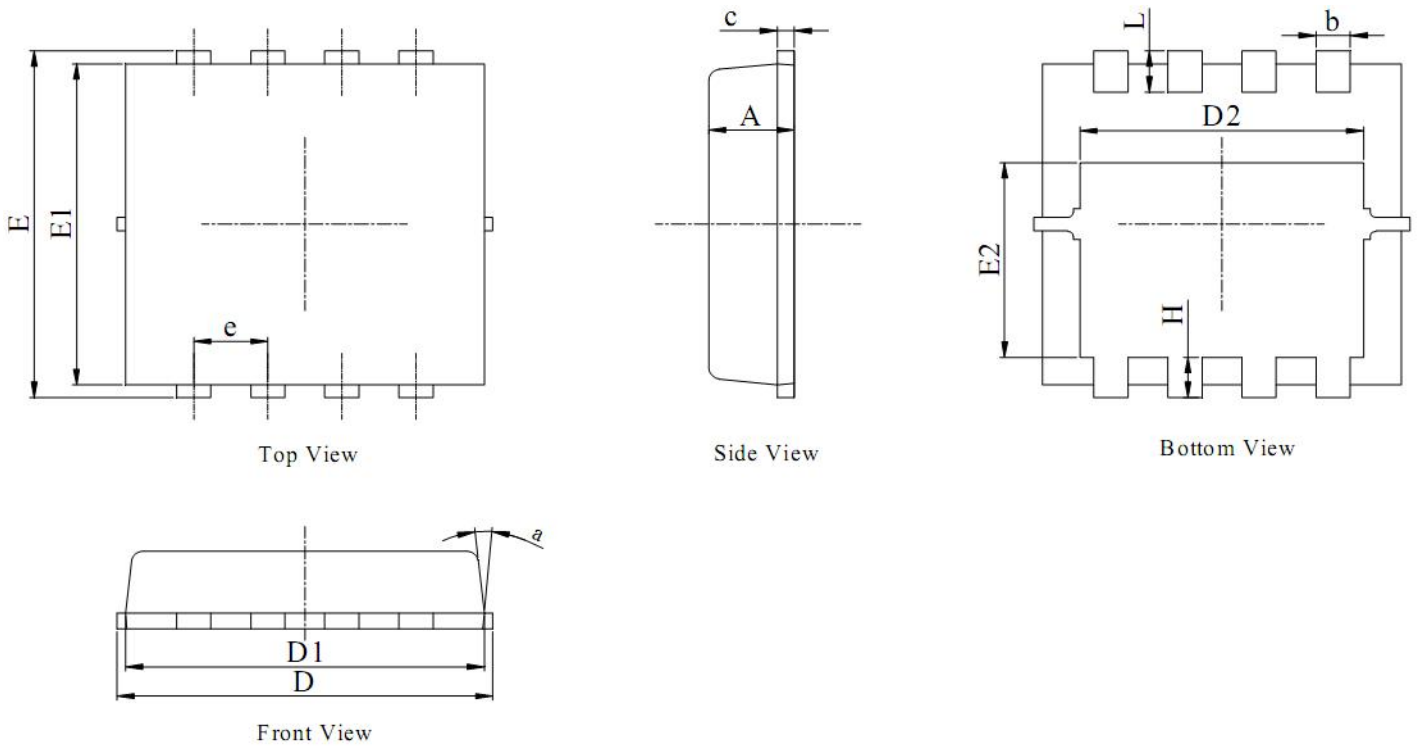


Figure 11. Normalized Maximum Transient Thermal Impedance



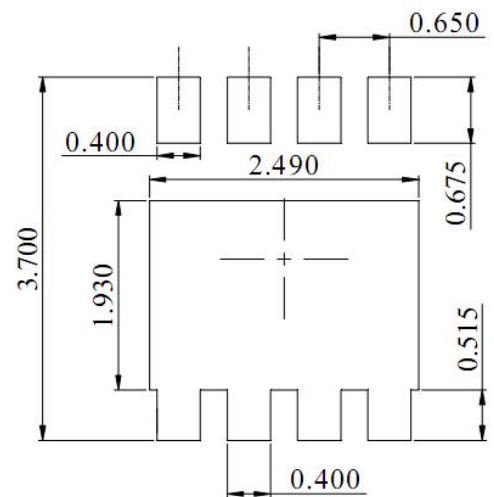
Package Dimensions PDFN3x3-8L



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.20	0.25
D	3.00	3.15	3.25
D1	2.95	3.05	3.15
D2	2.39	2.49	2.59
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.70	1.80	1.90
e	0.65 BSC		
H	0.30	0.40	0.50
L	0.25	0.40	0.50
a	---	---	15°



DIMENSIONS:MILLIMETERS



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