

## N-Channel 40V MOSFET

### E040N1P5HL1

$V_{DS}$ (V)	$R_{DS(on),max}$ (m $\Omega$ )	$I_D$ (A)
40V	1.5 @ $V_{GS} = 10V$	125

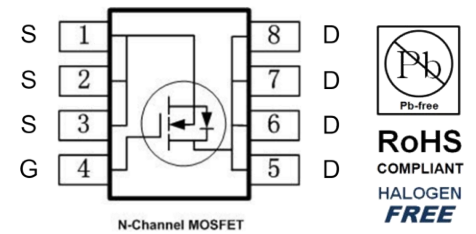
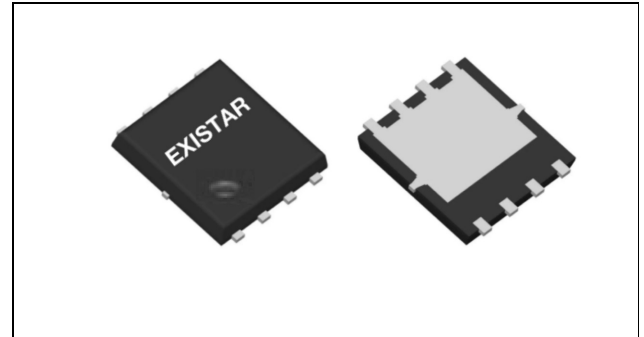
### Features

- Low  $R_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

### Applications

- DC/DC conversion
- Power switch
- PD charger
- Moto driver

### PDFN5X6



### Package And Ordering Information

Ordering code	Package	Marking
E040N1P5HL1	PDFN5x6	E040N1P5HL1

### Ordering Information

Package	Units/ Reel	Reels/ Inner Box	Units/ Inner Box
PDFN5x6	5000	1	5000

**Key Performance Parameters**

Parameter	Value	Unit
VDS, min @ Tj(max)	40	V
ID, pulse	865	A
RDS(ON), max @ VGS=10V	1.5	mΩ
Qg	127	nC

**Absolute Maximum Ratings at Tj=25°C Unless Otherwise Noted**

Parameter	Symbol	Limit	Unit
Drain-source voltage	V <sub>DS</sub>	40	V
Gate-source voltage	V <sub>GS</sub>	±20	
Continuous drain current	I <sub>D</sub>	T <sub>C</sub> =25°C	125
		T <sub>C</sub> =100°C	-
Pulsed drain current	I <sub>D,pulse</sub>	865	A
Avalanche energy, single pulse	E <sub>AS</sub>	870	mJ
Power dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	136
		T <sub>A</sub> =25°C	2
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C

**Thermal Characteristics**

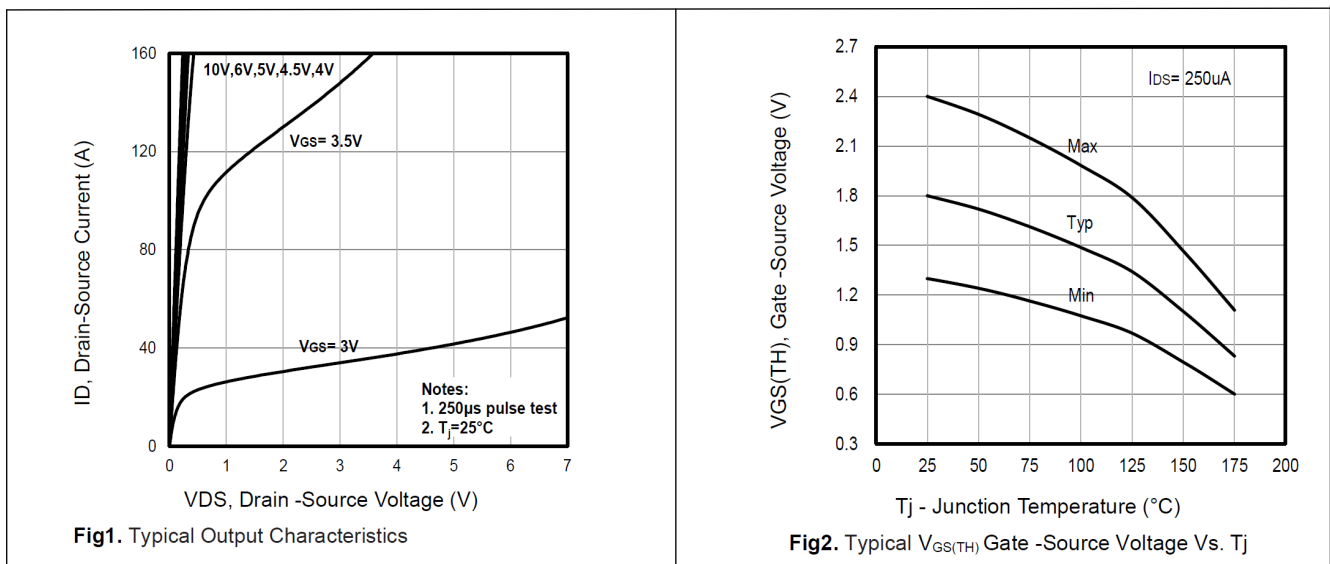
Parameter	Symbol	Max.	Unit
Thermal resistance, junction-to-case	R <sub>θJC</sub>	1	°C/W
Thermal resistance, junction-to-ambient	R <sub>θJA</sub>	62	

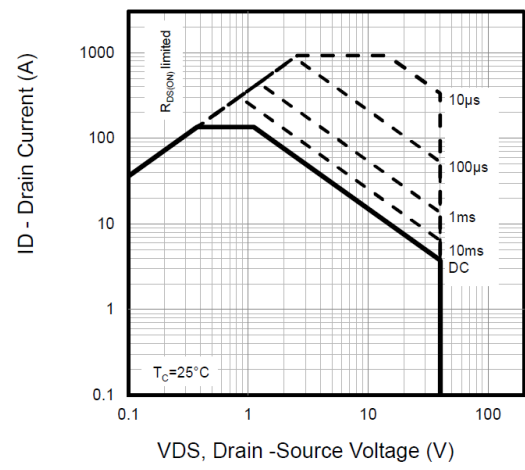
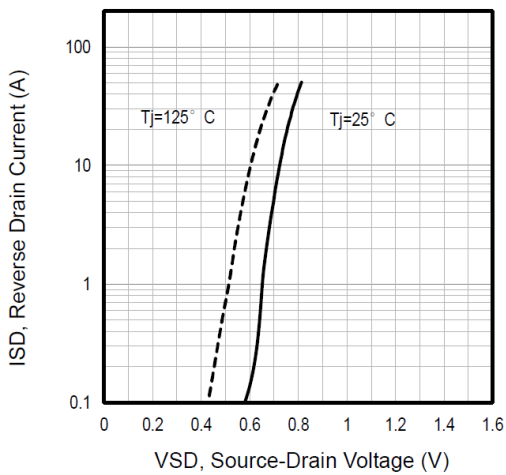
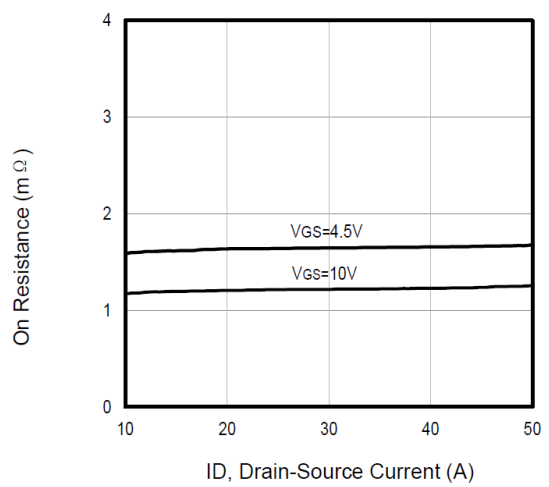
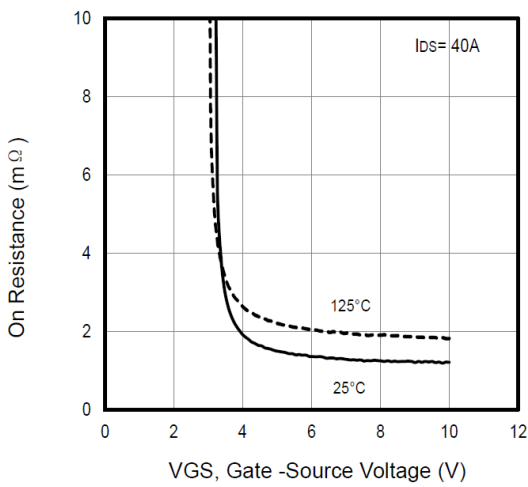
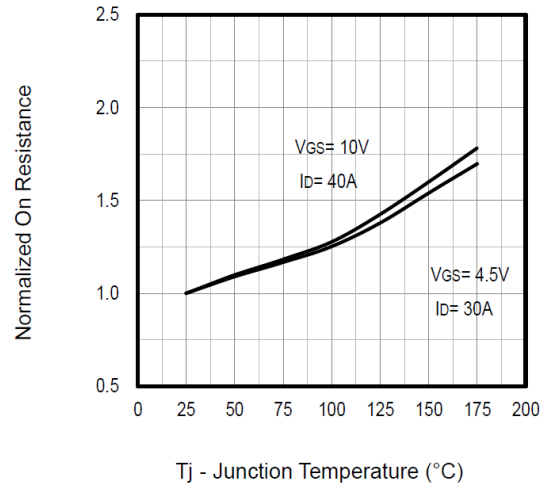
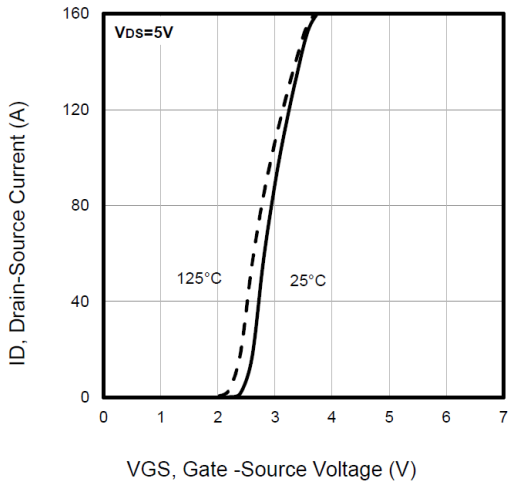
**Electrical Characteristics at Tj=25°C unless otherwise specified**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
<b>Static</b>						
Drain to source breakdown voltage	V <sub>(BR)DSS</sub>	40			V	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA
Gate-source threshold voltage	V <sub>GS(th)</sub>	1.3		2.4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA
Gate-body leakage	I <sub>GSS</sub>			±100	nA	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V
Zero gate voltage drain current	I <sub>DSS</sub>			1	μA	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V
Drain-source on-resistance	R <sub>DS(on)</sub>		1.15	1.5	mΩ	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 40 A
Drain-source on-resistance	R <sub>DS(on)</sub>		1.6	2.1	mΩ	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A

Forward transconductance	$g_{fs}$		-		S	$V_{DS} = 5\text{ V}, I_D = 30\text{ A}$
Gate resistance	$R_g$		3.8		$\Omega$	$f = 1\text{ MHz}$
<b>Gate Charge</b>						
Total gate charge	$Q_g$		124		nC	$V_{DS} = 20\text{ V}, I_D = 40\text{ A}, V_{GS} = 10\text{ V}$
Gate-source charge	$Q_{gs}$		25			
Gate-drain charge	$Q_{gd}$		18			
<b>Dynamic</b>						
Turn-on delay time	$t_{d(on)}$		11		ns	$V_{DS} = 20\text{ V}, I_D = 40\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 3\ \Omega$
Rise time	$t_r$		93			
Turn-off delay time	$t_{d(off)}$		144			
Fall time	$t_f$		90			
Input capacitance	$C_{iss}$		10530		pF	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$
Output capacitance	$C_{oss}$		2045			
Reverse transfer capacitance	$C_{rss}$		950			
<b>Body Diode</b>						
Diode forward voltage	$V_{SD}$			1.2	V	$V_{GS} = 0\text{ V}, I_F = 40\text{ A}$
Reverse recovery time	$t_{rr}$		57		ns	$V_R = 20\text{ V}, I_S = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$
Reverse recovery charge	$Q_{rr}$		58		nC	

### Electrical Characteristics Diagrams





Test circuits and waveforms

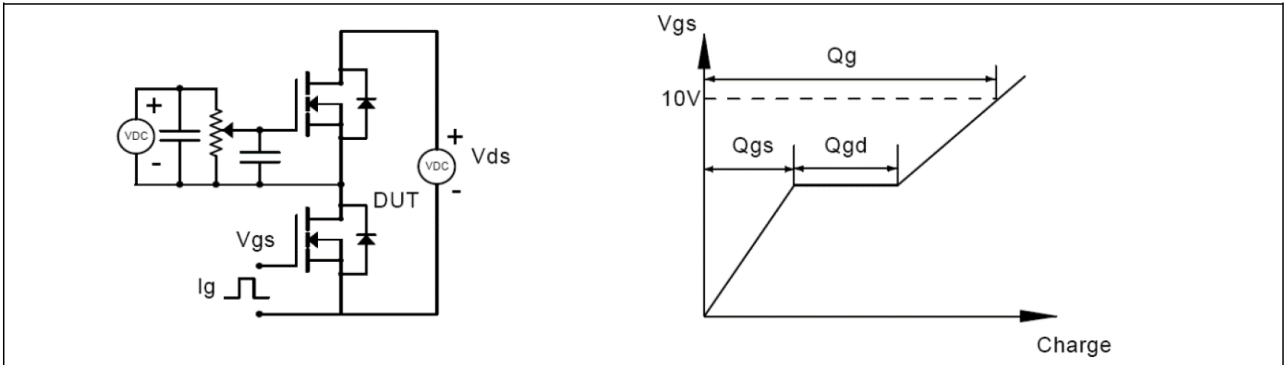


Figure 1. Gate charge test circuit & waveform

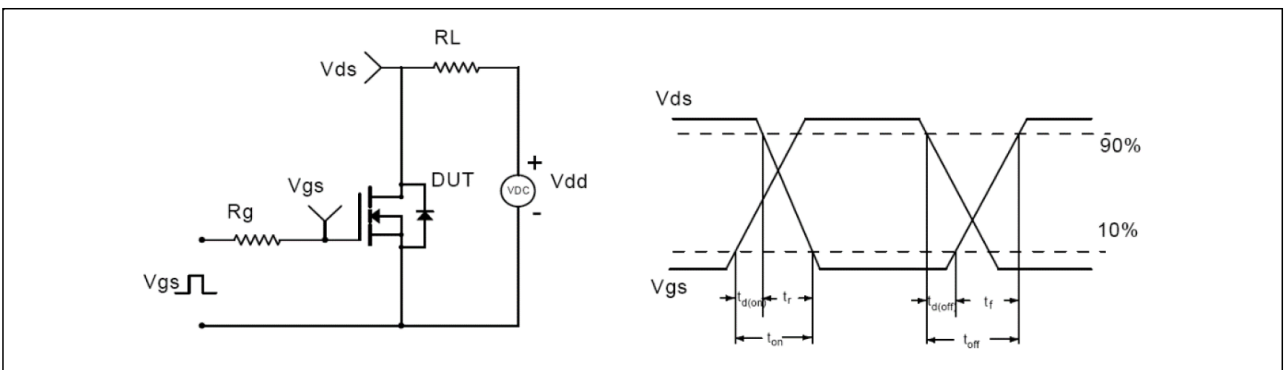


Figure 2. Switching time test circuit & waveforms

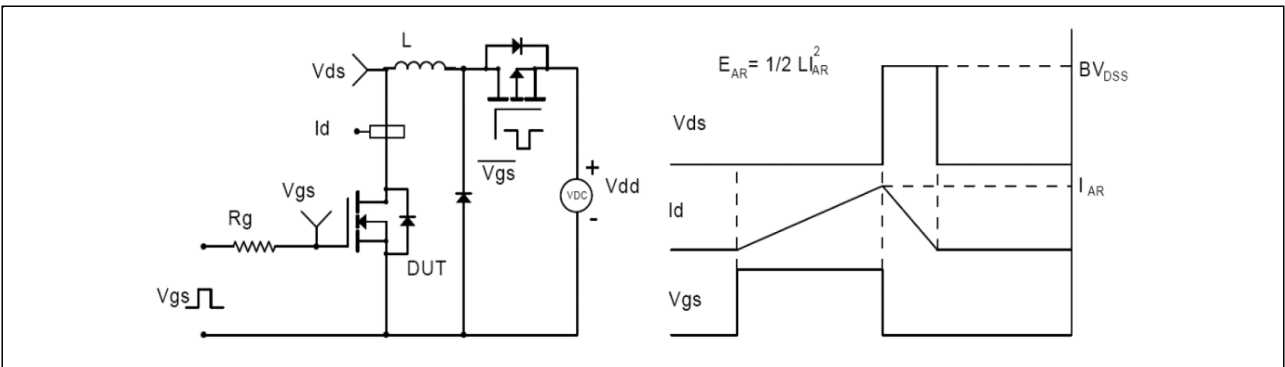


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

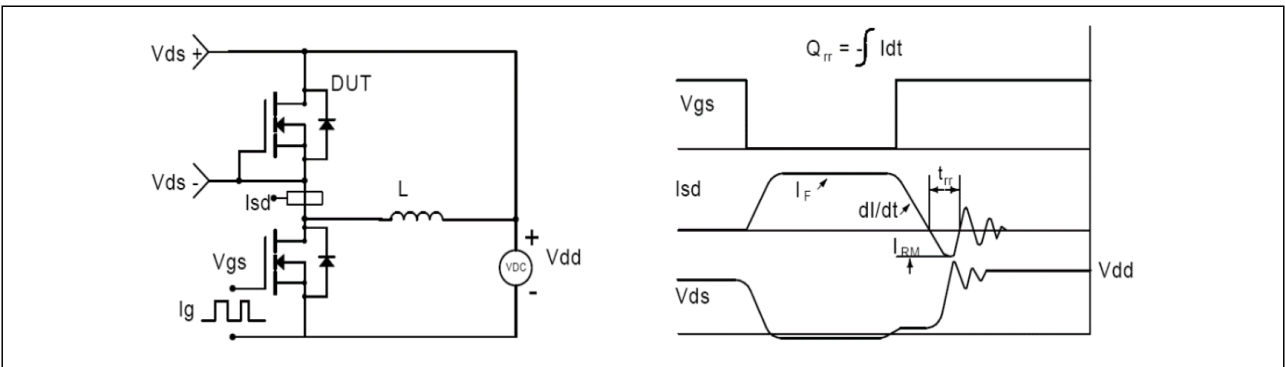
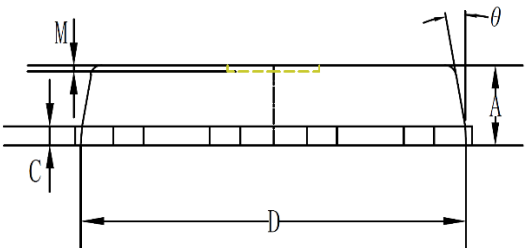
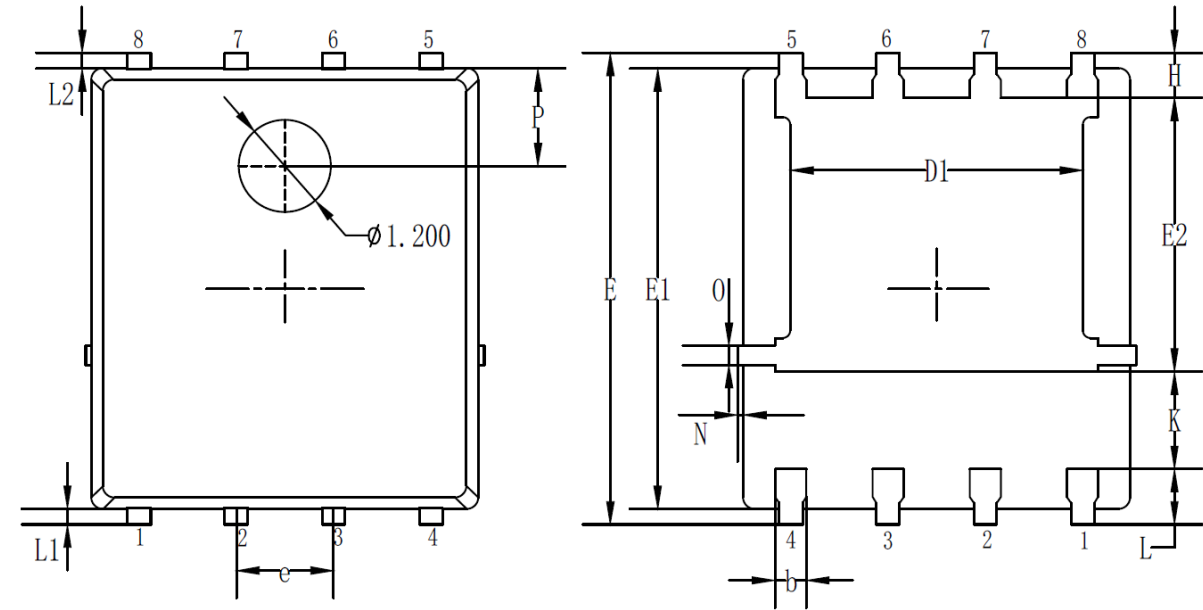


Figure 4. Diode reverse recovery test circuit & waveforms

**Package Outline Dimensions**


Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1	3.72	3.82	3.92
E	0.60	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
$\theta$	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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