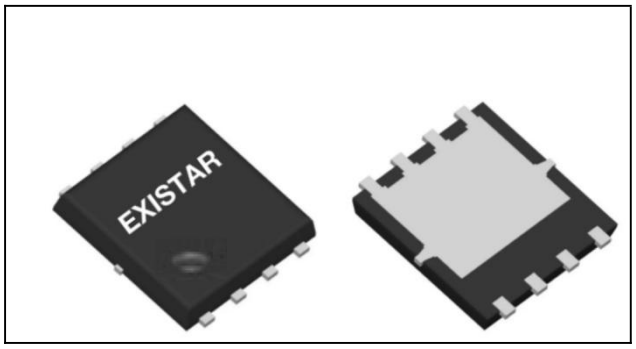
P-Channel 40V MOSFET

E040P013HL1

V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
-40V	13 @ V_{GS} = -10V	-63

PDFN5*6



Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

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

Package And Ordering Information

Ordering code	Package	Marking
E040P013HL1	PDFN5*6	E040P013HL1

Ordering Information

Package	Units/ Reel	Reels/ Inner Box	Units/ Inner Box
PDFN5*6	5000	1	5000

Key Performance Parameters

Parameter	Value	Unit
VDS, min @ Tj(max)	-40	V
ID, pulse	-252	A
RDS(ON), max @ VGS=10V	13	mΩ
Qg	61	nC

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

Parameter		Symbol	Limit	Unit
Drain-source voltage		V_{DS}	-40	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25°C	I_D	-63	A
	T_C=100°C		-44.8	
Pulsed drain current		$I_{D,pulse}$	-252	
Avalanche energy, single pulse		E_{AS}	272	mJ
Power dissipation	T_C=25°C	P_D	79	W
	T_A=25°C		-	
Operating junction and storage temperature range		T_J, T_{stg}	-55 To 175	℃

Thermal Characteristics

Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	1.9	°C/W
Thermal resistance, junction-to-ambient	Steady state	$R_{\theta JA}$	-	

Electrical Characteristics at Tj=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Static						
Drain to source breakdown voltage	$V_{(BR)DSS}$	-40			V	V_{GS} = 0, I_D = -250 μA
Gate-source threshold voltage	$V_{GS(th)}$	-1	-1.7	-2.5	V	V_{DS} = V_{GS}, I_D = -250 μA
Gate-body leakage	I_{GSS}			±100	nA	V_{DS} = 0 V, V_{GS} = ±20 V
Zero gate voltage drain current	I_{DSS}			-1	μA	V_{DS} = -40 V, V_{GS} = 0 V
Drain-source on-resistance	$R_{DS(on)}$		10.2	13	mΩ	V_{GS} = -10 V, I_D = -15 A
Drain-source on-resistance	$R_{DS(on)}$		13.8	16.5	mΩ	V_{GS} = -4.5 V, I_D = -10 A
Forward transconductance	gfs		35		S	V_{DS} = -5 V, I_D = -15 A

Gate resistance	Rg		4.87		Ω	f=1MHz
Gate Charge						
Total gate charge	Qg		61		nC	V_{DS} = -20 V, I_D = -20 A, V_{GS} = -10 V
Gate-source charge	Qgs		8.7			
Gate-drain charge	Qgd		15.3			
Dynamic						
Turn-on delay time	$t_{d(on)}$		11.5		ns	V_{DS} = -20 V, V_{GS} = -10 V, R_L=1Ω, R_{GEN} = 3 Ω
Rise time	t_r		13.5			
Turn-off delay time	$t_{d(off)}$		39			
Fall time	t_f		13			
Input capacitance	C_{iss}		2969		pF	V_{DS} = -20 V, V_{GS} = 0 V, f = 1.0MHz
Output capacitance	C_{oss}		239			
Reverse transfer capacitance	C_{rss}		218			
Body Diode						
Diode forward voltage	V_{SD}			-1.2	V	V_{GS} = 0 V, I_F = -15 A
Reverse recovery time	t_{rr}		43		ns	I_S = -20 A, di/dt = 100 A/μs
Reverse recovery charge	Q_{rr}		48		nC	

Electrical Characteristics Diagrams

Figure 1. Output Characteristics

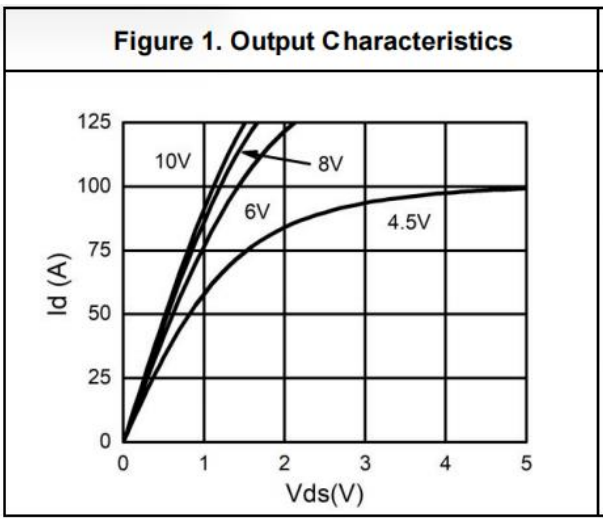


Figure 2. Transfer Characteristics

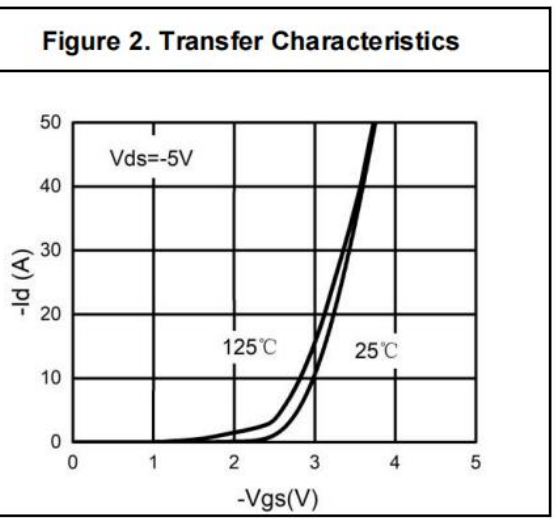


Figure 3. Power Dissipation

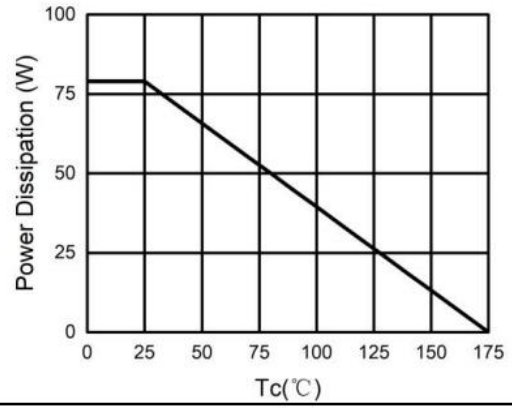


Figure 4. Drain Current

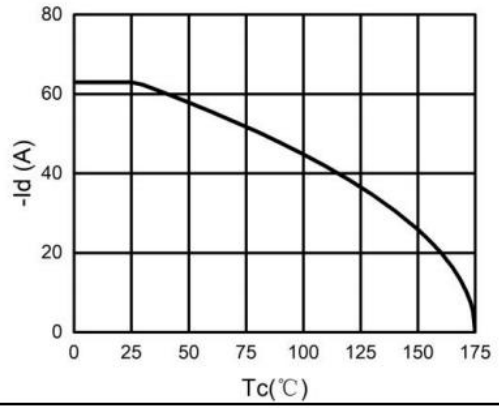


Figure 5. BV_{DSS} vs Junction Temperature

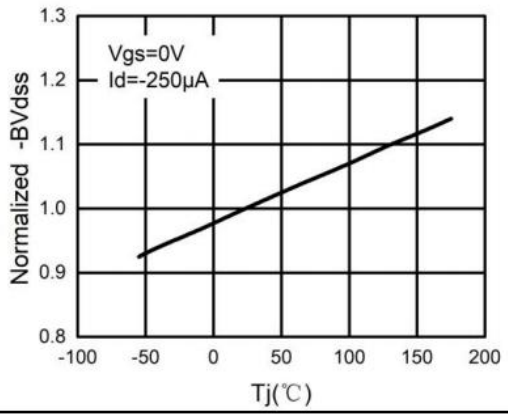


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

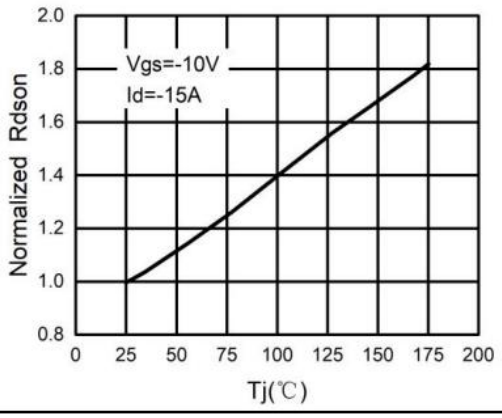


Figure 7. Gate Charge Waveforms

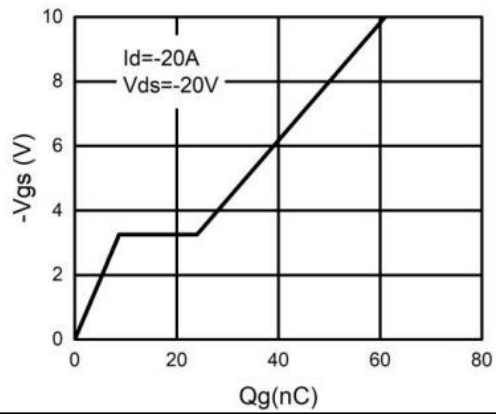


Figure 8. Capacitance

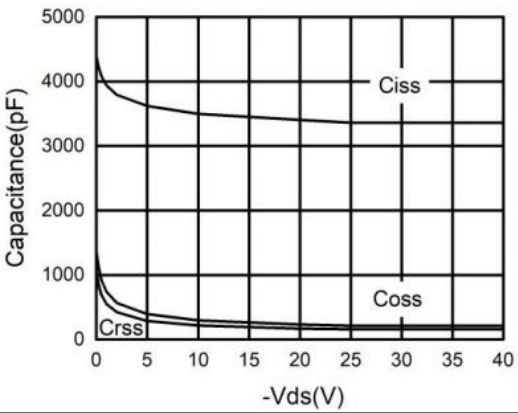


Figure 9. Body-Diode Characteristics

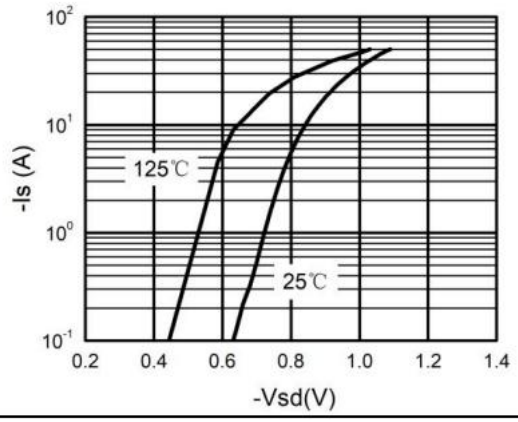
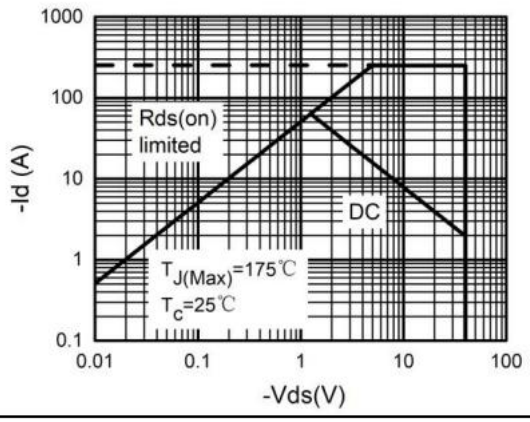
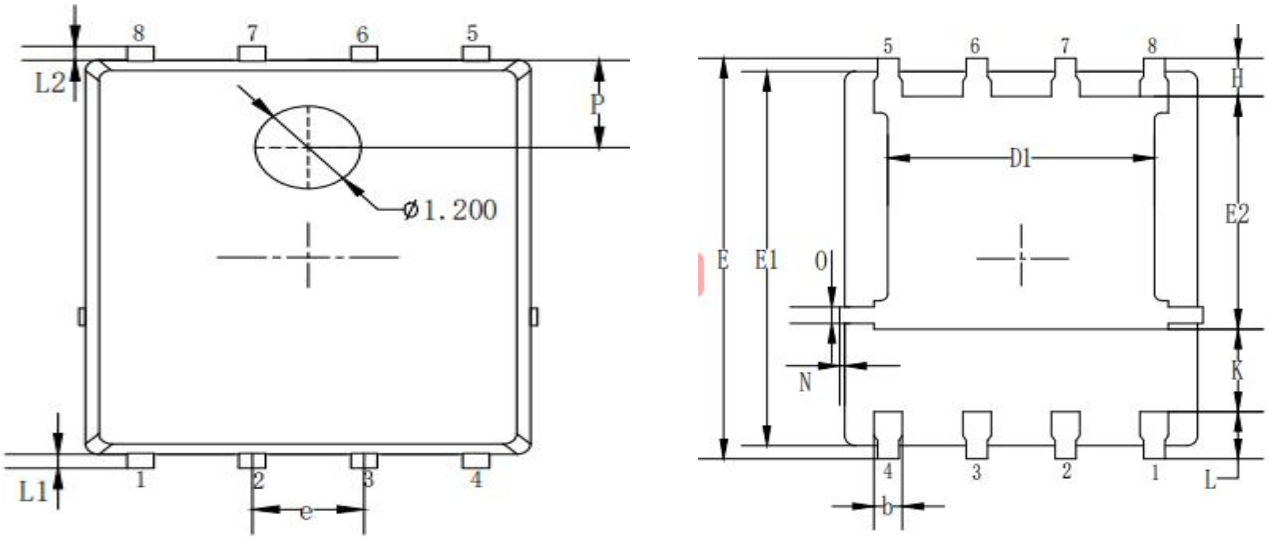


Figure 10. Maximum Safe Operating Area



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	5.10
D1	3.72	3.82	3.92
E	6.00	6.15	6.25
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	0.69	0.75
L1/L2	0.10~0.20		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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