

SuperMOS–PDFN5*6-8L 30V BV_{DSS}, 1.15mΩ R_{DS(on)}, N-channel MOSFET

1. Description

The TPH1R403NL-ES is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product TPH1R403NL-ES is Pb-free.

2. Features

- 30V, R_{DS(ON)}=1.15mΩ(TYP.) @V_{GS}=10V
R_{DS(ON)}=1.5mΩ(TYP.) @V_{GS}=4.5V
- Use trench MOSFET technology
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
TPH1R403NL-ES	PDFN5*6-8L	ESN6512/lot	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

Table-1 Ordering information

5. Pin Configuration and Functions

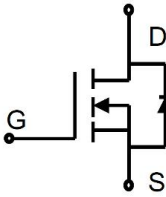
Pin	Function	Outline	Circuit Diagram
4	Gate		
1/2/3	Source		
5/6/7/8	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}C$	I_D	120	A
	$T_C=100^{\circ}C$		78	
Maximum Power Dissipation	$T_C=25^{\circ}C$	P_D	120	W
	$T_C=100^{\circ}C$		48	
Pulsed Drain Current ^a		I_{DM}	480	A
Avalanche Current (L=0.5mH)		I_{AS}	43	A
Avalanche energy		E_{AS}	462	mJ
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Case Thermal Resistance ^a	$R_{\theta JC}$	1.04	°C/W

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

TPH1R403NL-ES

Rev-1.4

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V			1.0	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.2	1.5	2.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		1.15	1.5	mΩ
		V _{GS} =4.5V, I _D =20A		1.5	2.2	mΩ
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =20A			150	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =15V		4050		pF
Output Capacitance	C _{OSS}			1710		
Reverse Transfer Capacitance	C _{RSS}			140		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =10V, I _D =30A		68		nC
Gate-to-Source Charge	Q _{GS}			12		
Gate-to-Drain Charge	Q _{GD}			17		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =15V, I _D =50A, R _G =1Ω		18		ns
Rise Time	t _r			11		
Turn-Off Delay Time	t _{d(OFF)}			64		
Fall Time	t _f			11		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	0.45		1.2	V

7. Typical Characteristic

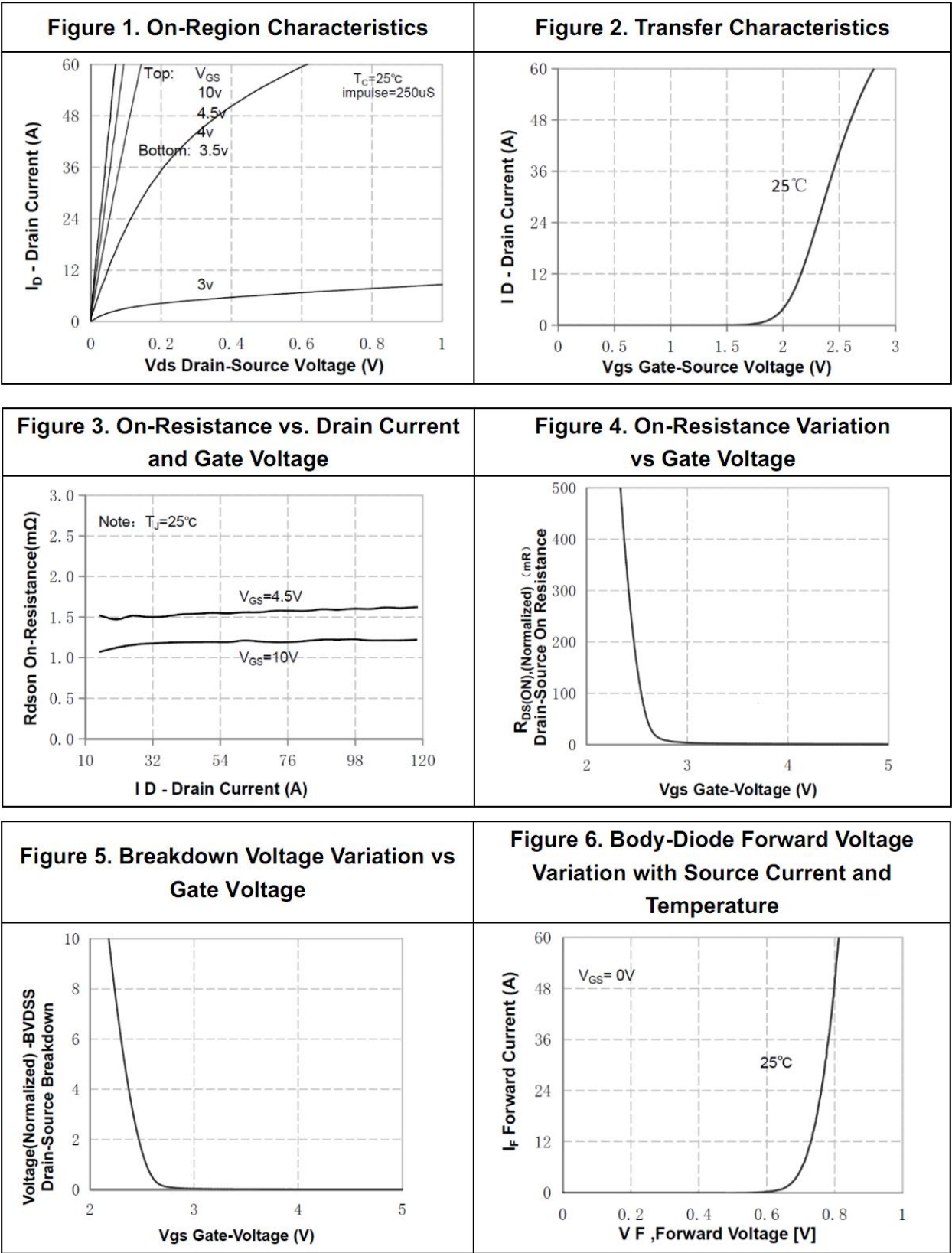


Figure 7. Gate-Charge Characteristics

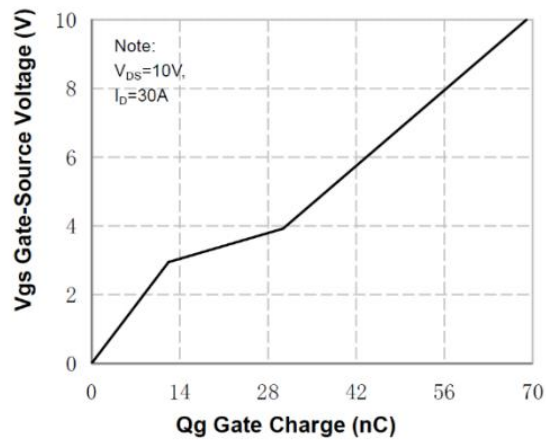


Figure 8. Capacitance Characteristics

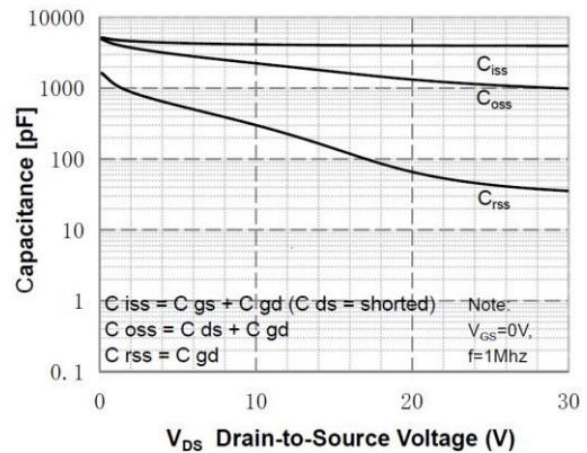


Figure 9. Maximum Forward Biased Safe Operating Area

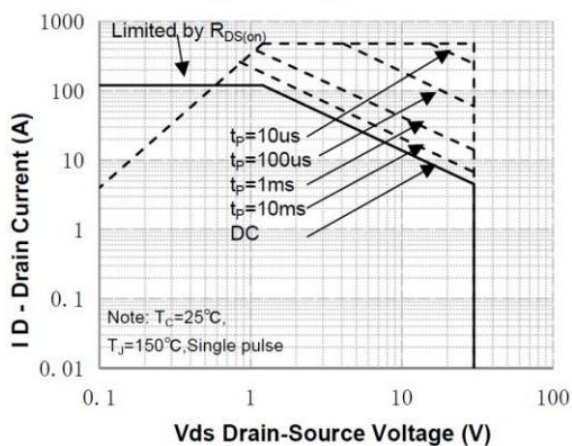


Figure 10. Maximum PContinuous Drain Current vs Case Temperature

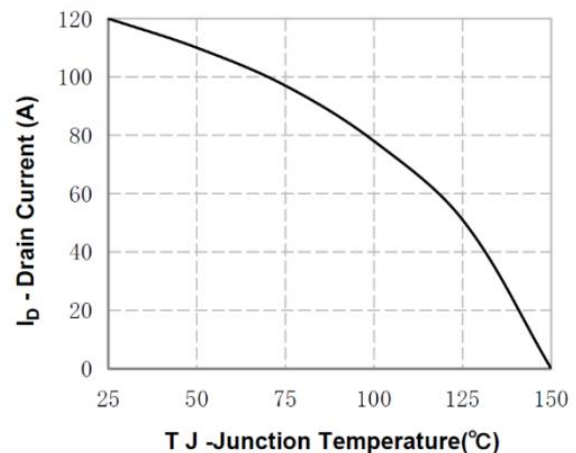
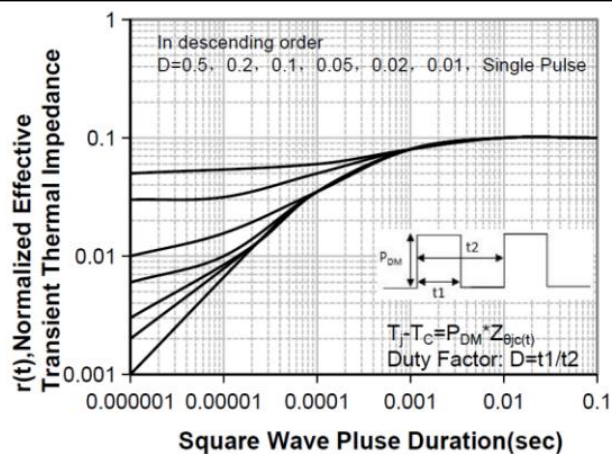
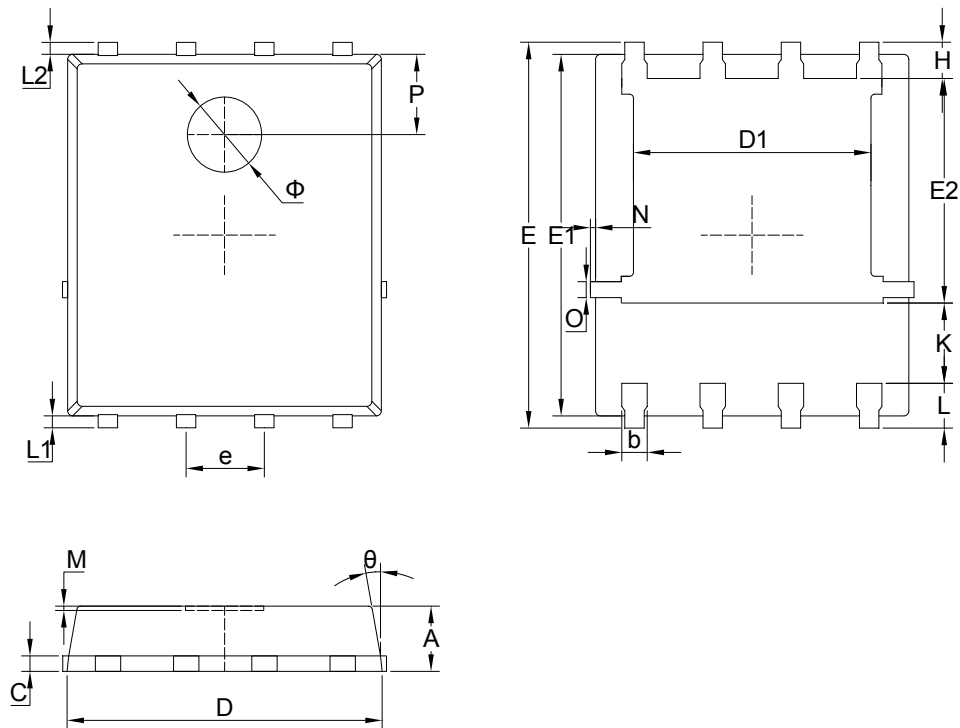


Figure 11. Normalized Maximum Transient Thermal Impedance



8. Dimension (PDFN5*6-8L)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.90	1.05	1.20	H	0.48	0.58	0.68
b	0.35	0.40	0.50	K	1.17	1.27	1.37
C	0.20	0.25	0.35	L	0.64	0.74	0.84
D	4.90	5.05	5.20	L1/L2	0.20 REF.		
D1	3.72	3.82	3.92	θ	8°	10°	12°
E	6.00	6.15	6.30	M	0.08 REF.		
E1	5.60	5.75	5.90	N	0	-	0.15
E2	3.47	3.57	3.67	O	0.25 REF.		
e	1.27 BSC.			P	1.28 REF.		
Φ	1.20 REF						

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