

TPH6400ENH-VB Datasheet

N-Channel 200V (D-S) MOSFET

PRODUCT SUMMARY

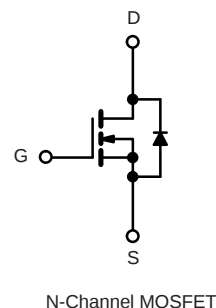
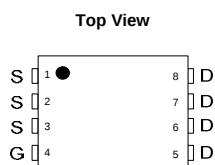
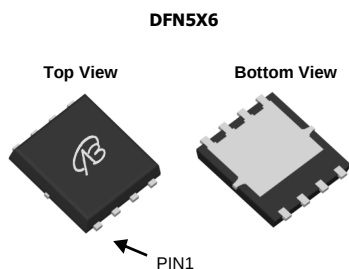
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a
200	0.063 at $V_{GS} = 10$ V	20
	0.067 at $V_{GS} = 4.5$ V	16

FEATURES

- 175 °C Junction Temperature
- SGT technology Power MOSFET
- Material categorization:



RoHS
COMPLIANT



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ($T_J = 175$ °C) ^b	$T_C = 25$ °C	I_D	20	A
	$T_C = 100$ °C		12 ^a	
Pulsed Drain Current		I_{DM}	60	
Continuous Source Current (Diode Conduction)		I_S	30 ^a	
Avalanche Current		I_{AS}	15	mJ
Single Avalanche Energy (Duty Cycle ≤ 1 %)	$L = 0.1$ mH	E_{AS}	110	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	136	W
	$T_A = 25$ °C		3 ^b , 8.3 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10$ sec	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	0.85	1.1	

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. $t \leq 10$ s.

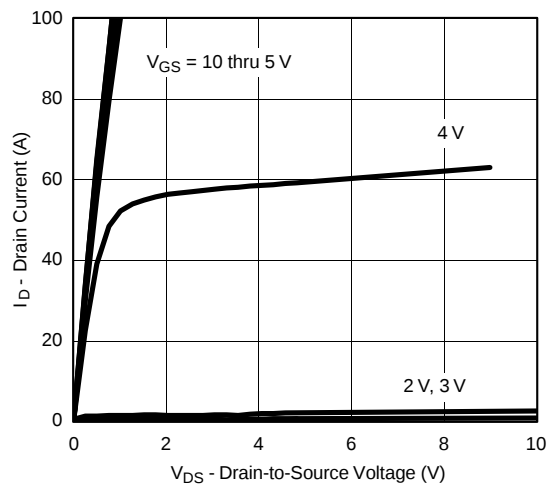
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	200			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30V, V _{GS} = 0 V			1	μA
		V _{DS} = 30V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 30V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	60			A
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.063		Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125 °C		0.094		
		V _{GS} = 10 V, I _D = 20 A, T _J = 175 °C		0.126		
		V _{GS} = 4.5 V, I _D = 8.5A		0.067		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A		60		S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 200 V, f = 1 MHz		1100		pF
Output Capacitance	C _{oss}			470		
Reverse Transfer Capacitance	C _{rss}			225		
Total Gate Charge ^c	Q _g	V _{DS} = 200 V, V _{GS} = 10 V, I _D = 50 A		48	70	nC
Gate-Source Charge ^c	Q _{gs}			26		
Gate-Drain Charge ^c	Q _{gd}			17		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 200 V, R _L = 0.6 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω		23	28	ns
Rise Time ^c	t _r			15	25	
Turn-Off Delay Time ^c	t _{d(off)}			35	50	
Fall Time ^c	t _f			20	30	
Source-Drain Diode Ratings and Characteristics (T _C = 25 °C)						
Pulsed Current	I _{SM}				60	A
Diode Forward Voltage	V _{SD}	I _F = 20 A, V _{GS} = 0 V		1	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 20 A, di/dt = 100 A/μs		4	135	ns

Notes:

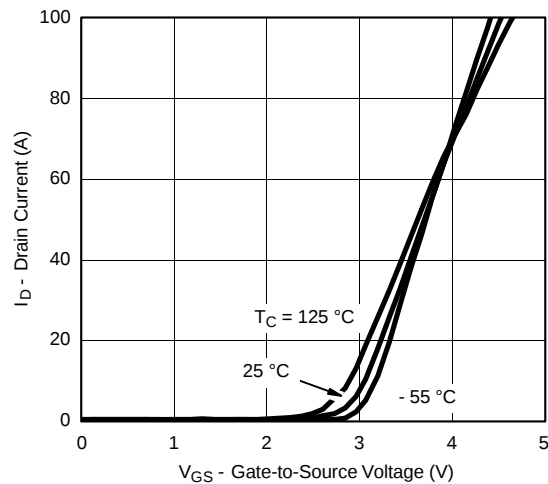
- a. For design aid only; not subject to production testing.
 b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

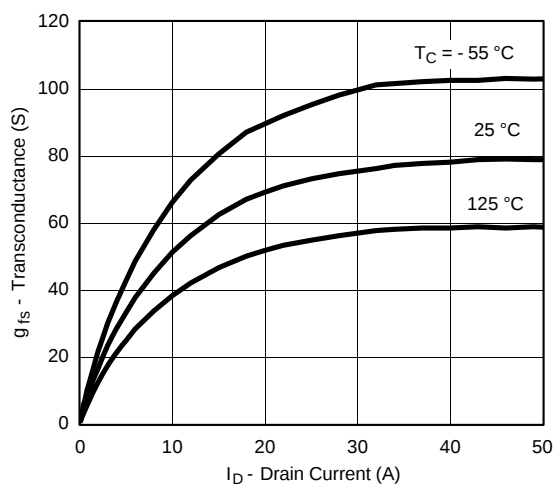
TYPICAL CHARACTERISTICS (25 °C unless noted)



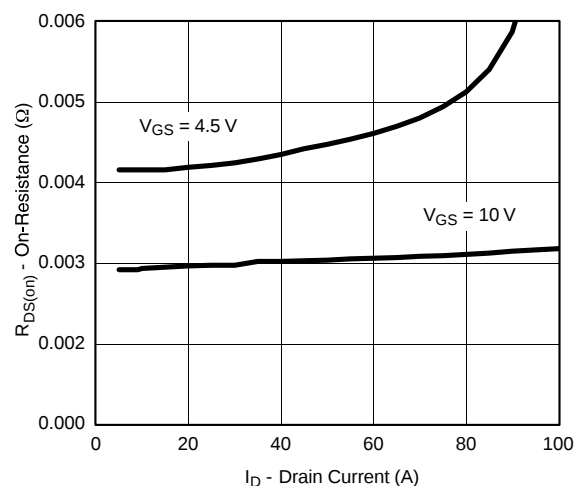
Output Characteristics



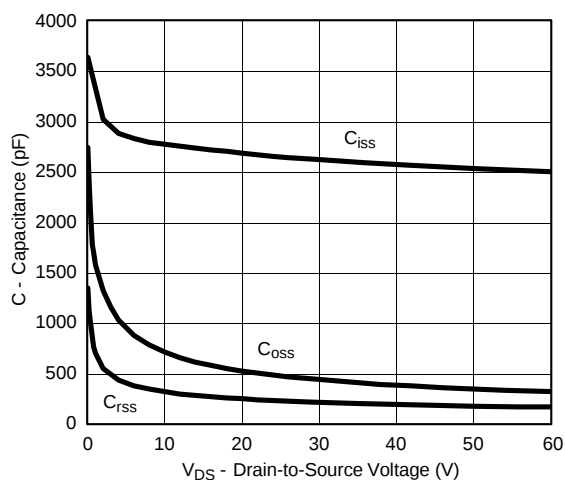
Transfer Characteristics



Transconductance



On-Resistance vs. Drain Current

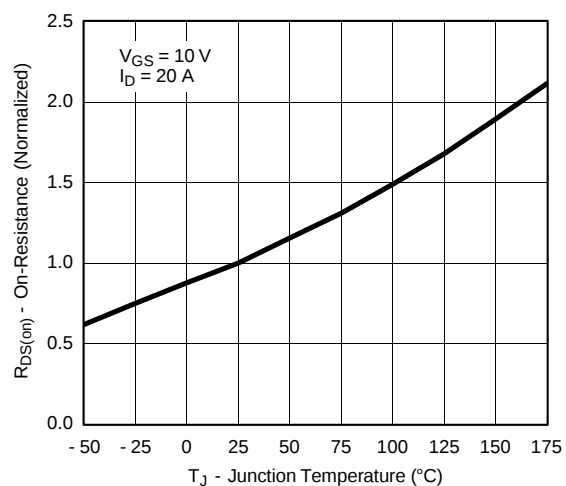


Capacitance

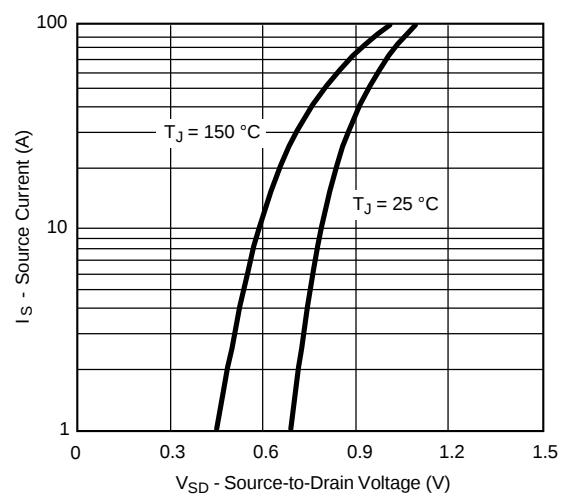


Gate Charge

TYPICAL CHARACTERISTICS (25 °C unless noted)



On-Resistance vs. Junction Temperature

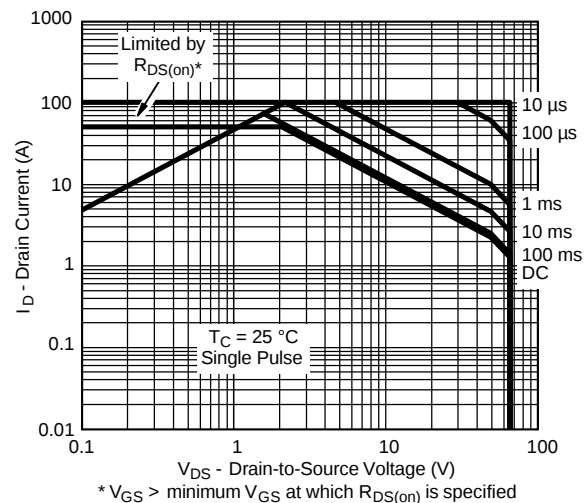


Source-Drain Diode Forward Voltage

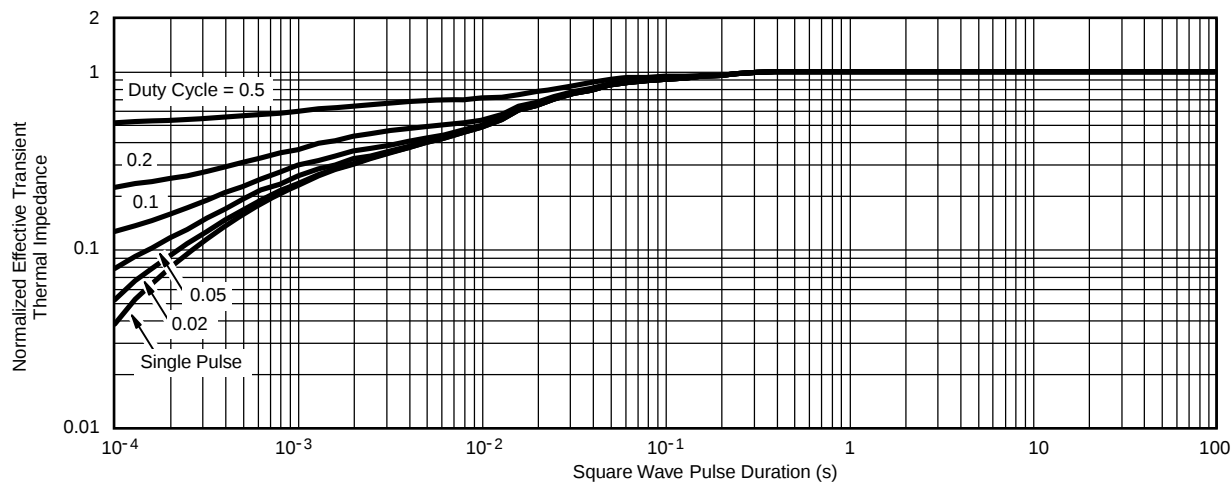
THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature

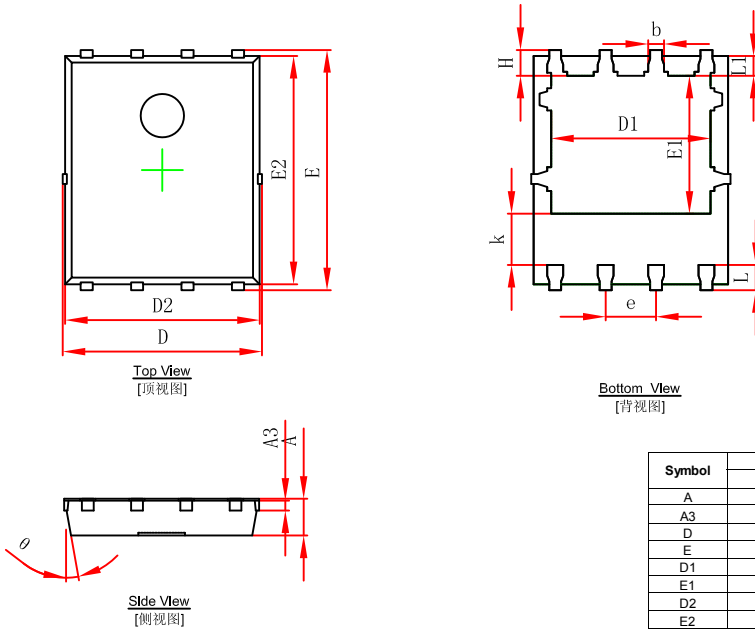


Safe Operating Area



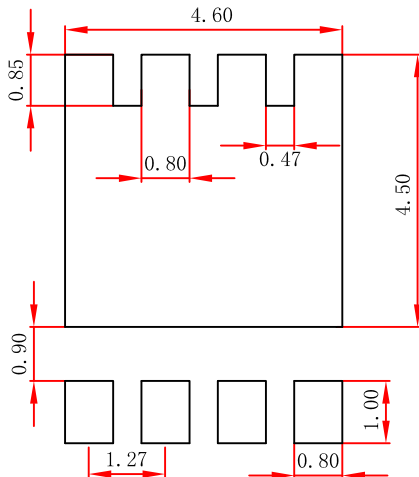
Normalized Thermal Transient Impedance, Junction-to-Case

PDFNWB5x6-8L Package Outline Dimensions



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

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