

## P-Channel Enhancement Mode Power MOSFET

### DESCRIPTION

The PTHEÚÍÍS uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

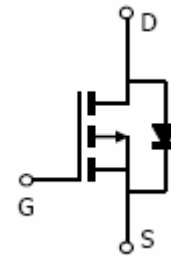
### GENERAL FEATURES

- $V_{DS} = -55V, I_D = -30A$   
 $R_{DS(ON)} < 40m\Omega @ V_{GS} = -10V$
- High density cell design for ultra low  $R_{dson}$
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

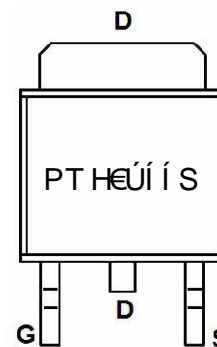
### Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

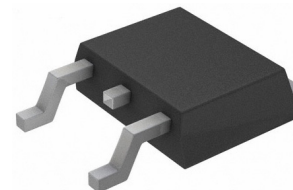
**100% UIS TESTED!**



Schematic diagram



Marking and pin Assignment



TO-252-2L top view

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
PTHEÚÍÍS	PTHEÚÍÍS	TO-252-2L	-	-	-

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-55	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-30	A
Drain Current-Continuous( $T_C=100^\circ C$ )	$I_D(100^\circ C)$	-21	A
Pulsed Drain Current	$I_{DM}$	110	A
Maximum Power Dissipation	$P_D$	90	W
Derating factor		0.72	W/°C
Single pulse avalanche energy (Note 5)	$E_{AS}$	260	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

**Thermal Characteristic**

Thermal Resistance, Junction-to-Case(Note 2)	$R_{\theta JC}$	1.39	$^{\circ}C/W$
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**Electrical Characteristics (TC=25 $^{\circ}C$  unless otherwise noted)**

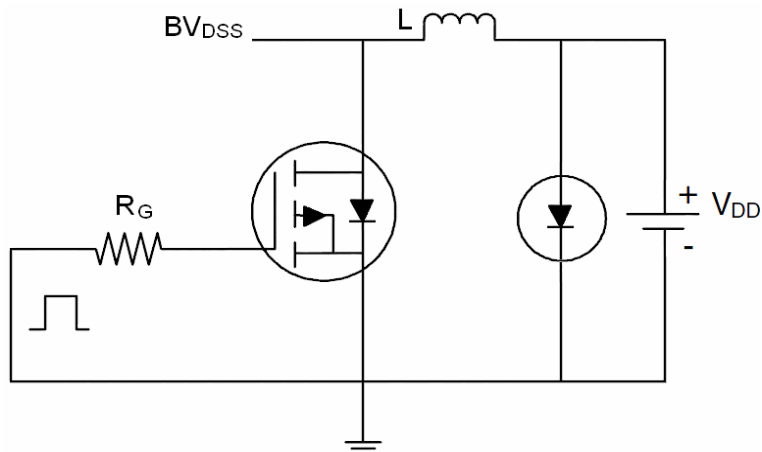
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-55	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-55V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-2	-3	-4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-15A$	-	30	40	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-25V, I_D=-16A$	8	-	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-30V, V_{GS}=0V,$ $F=1.0MHz$	-	3500	-	PF
Output Capacitance	$C_{oss}$		-	240	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	153	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, I_D=-15A$ $V_{GS}=-10V, R_{GEN}=3\Omega$	-	12	-	nS
Turn-on Rise Time	$t_r$		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	$t_f$		-	15	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-44V, I_D=-16A,$ $V_{GS}=-10V$	-	56	-	nC
Gate-Source Charge	$Q_{gs}$		-	11	-	nC
Gate-Drain Charge	$Q_{gd}$		-	24	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-24A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	-30	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^{\circ}C, I_F = -15A$ $di/dt = 100A/\mu s(\text{Note3})$	-	-	71	nS
Reverse Recovery Charge	$Q_{rr}$		-	-	170	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

**Notes:**

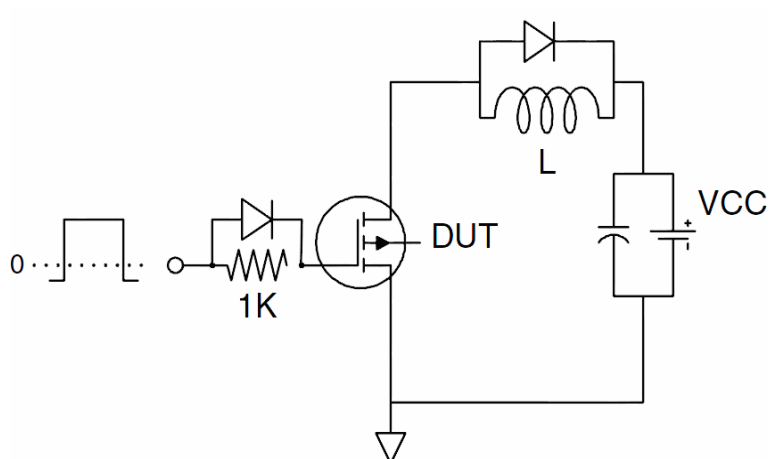
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^{\circ}C, V_{DD}=-25V, V_G=-20V, L=0.5mH, R_g=25\Omega$

### Test Circuit

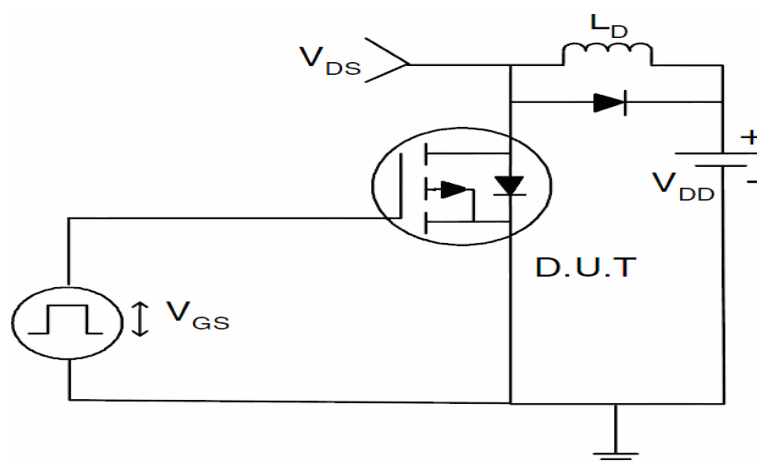
#### 1) $E_{AS}$ Test Circuit



#### 2) Gate Charge Test Circuit



#### 3) Switch Time Test Circuit



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

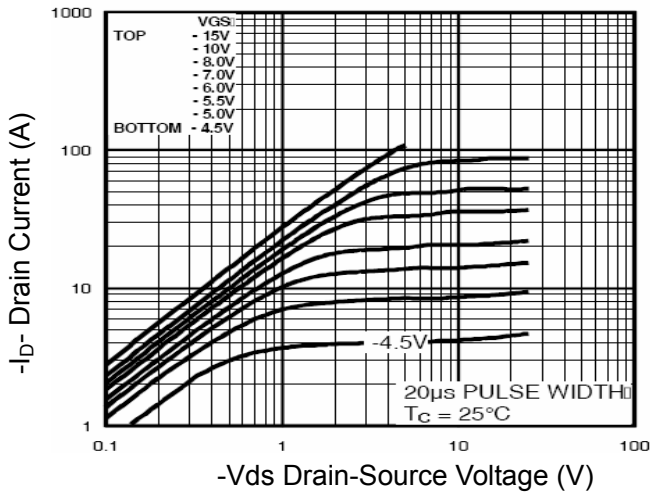


Figure 1 Output Characteristics

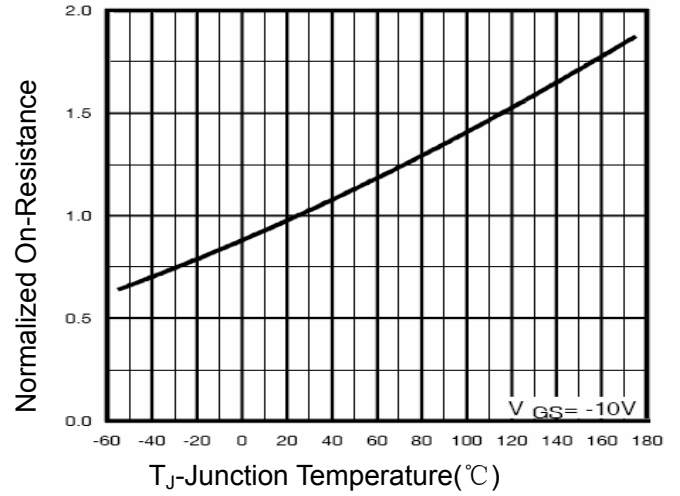


Figure 4  $R_{dson}$ -Junction Temperature

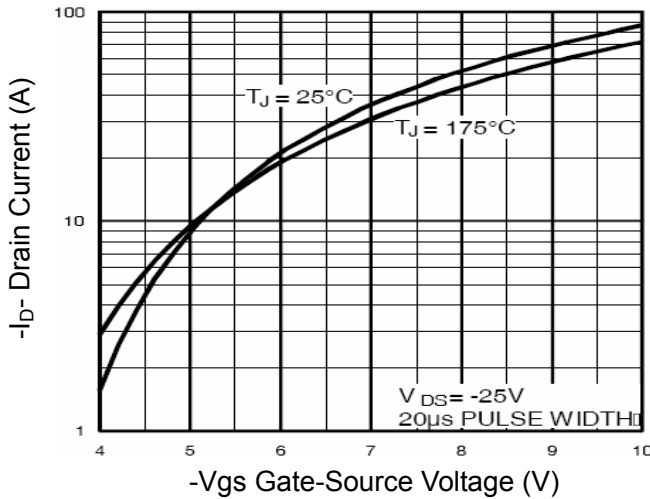


Figure 2 Transfer Characteristics

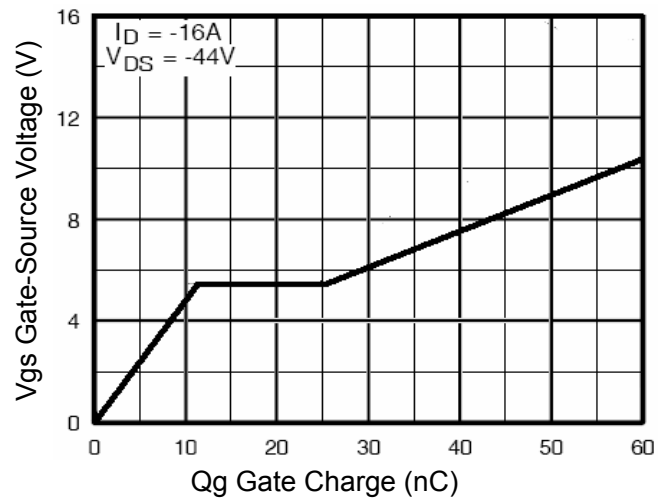


Figure 5 Gate Charge

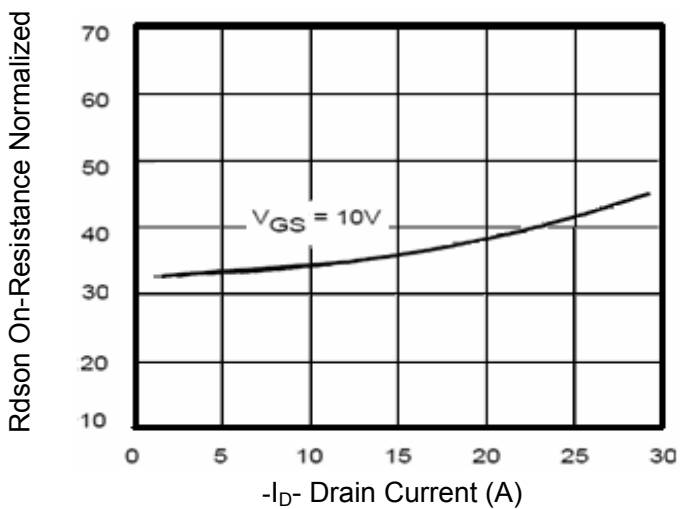


Figure 3  $R_{dson}$ - Drain Current

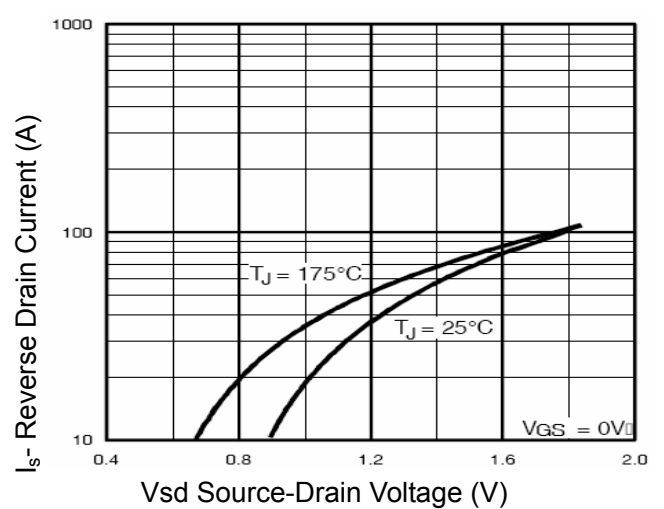
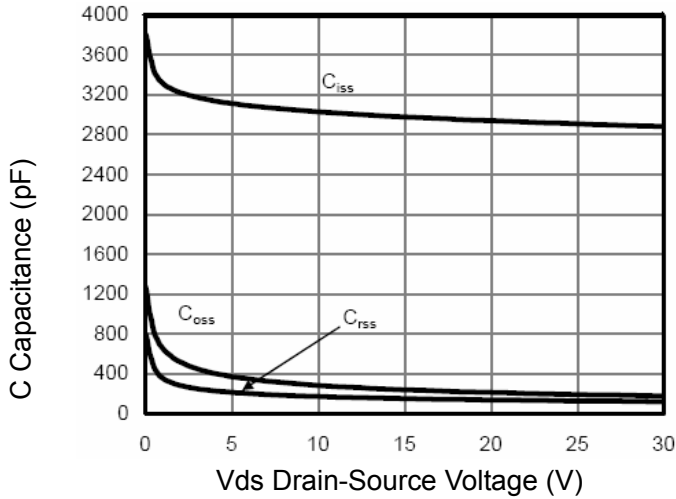
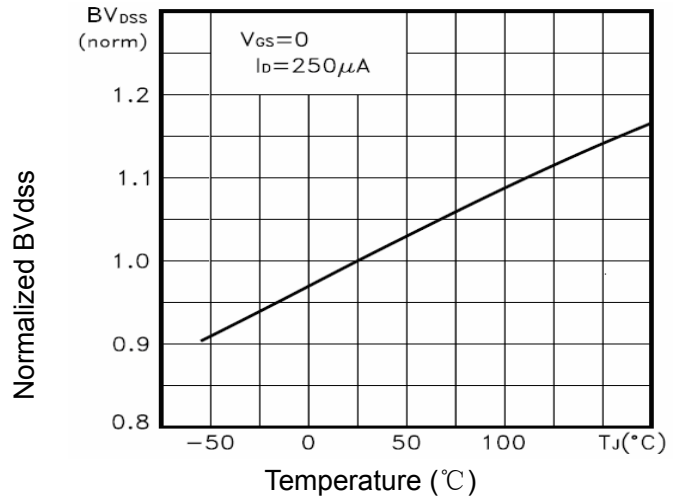


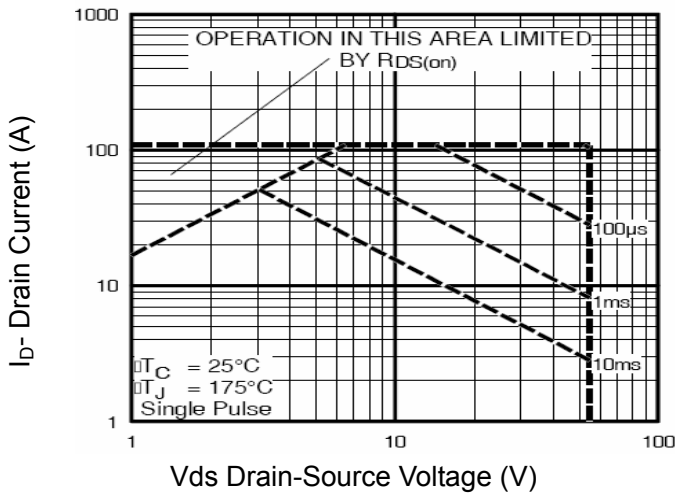
Figure 6 Source- Drain Diode Forward



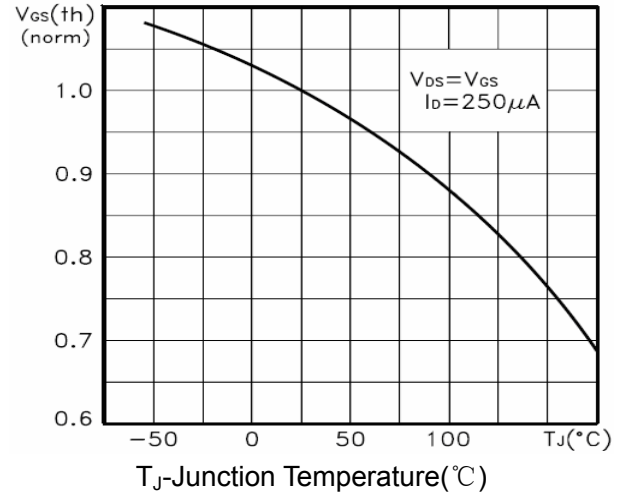
**Figure 7 Capacitance vs Vds**



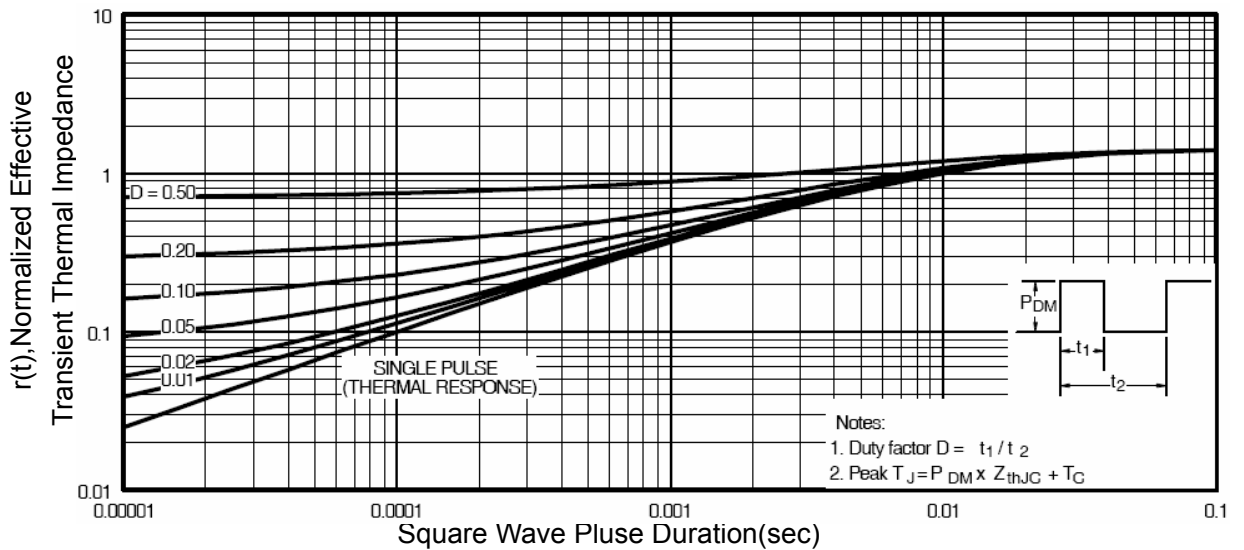
**Figure 9  $BV_{DSS}$  vs Junction Temperature**



**Figure 8 Safe Operation Area**

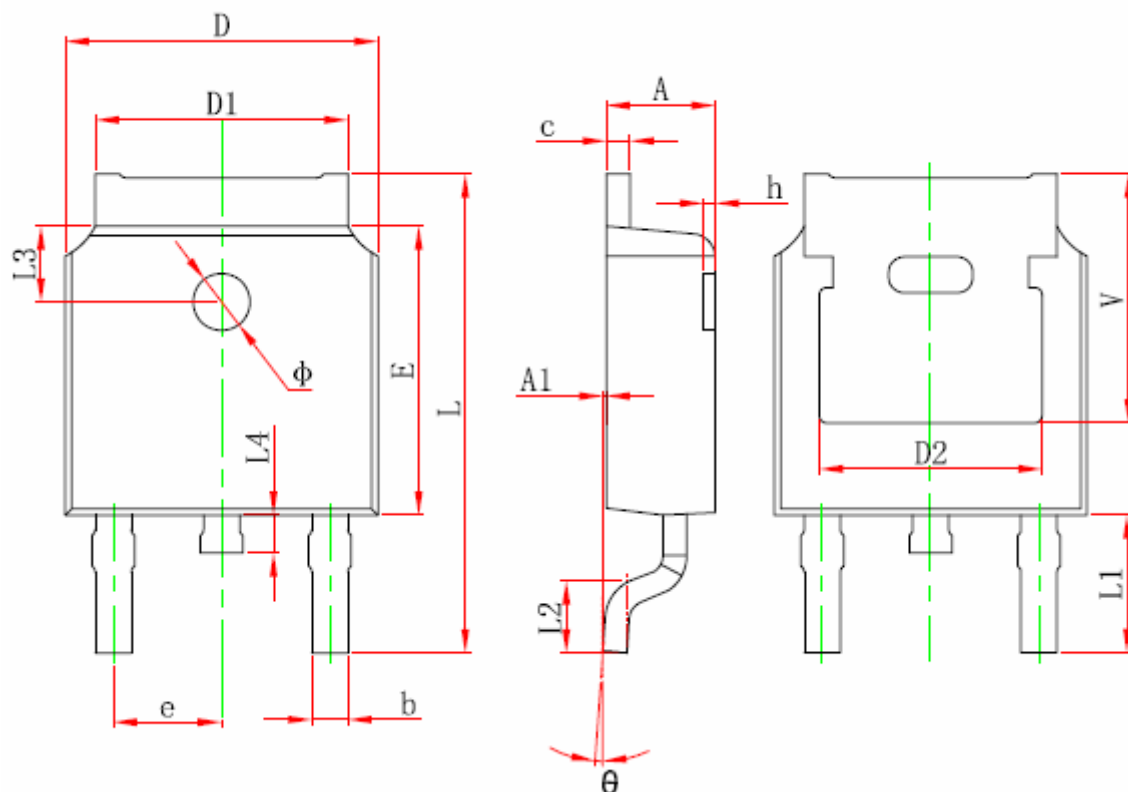


**Figure 10  $V_{GS(th)}$  vs Junction Temperature**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## TO-252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	

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