

### Features

- 30V, 90A  
 $R_{DS(ON)} 3.88m\Omega @ V_{GS} = 10V$  (Typ)
- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

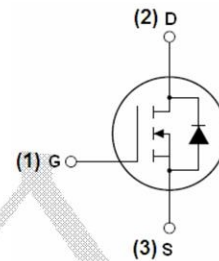
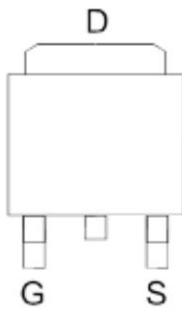
### Application

- Load Switch
- PWM Application
- Power management

### Package and Pin Configuration

(TO-252-3L)

Top View



### Marking:



### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	90
		$T_C = 100^\circ\text{C}$	60
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>	180	A
EAS	Single Pulsed Avalanche Energy <sup>note2</sup>	225	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	181
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	$^\circ\text{C}/\text{W}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.8	1.4	2.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance	$V_{GS}=10V, I_D=10A$	-	3.88	5.0	m $\Omega$
$R_{DS(on)}$	Static Drain-Source on-Resistance	$V_{GS}=4.5V, I_D=8A$	-	6.3	7.5	m $\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V,$ $f=1.0MHz$	-	5672	-	pF
$C_{oss}$	Output Capacitance		-	392	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	352	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	103	-	nC
$Q_{gs}$	Gate-Source Charge		-	15	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	32	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=30V, I_D=30A,$ $R_G=1.8\Omega, V_{GS}=10V$	-	12	-	ns
$t_r$	Turn-on Rise Time		-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	49	-	ns
$t_f$	Turn-off Fall Time		-	15	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	90	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	180	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=5A$	-	0.78	1.0	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=30A,$ $dI/dt=100A/\mu s$	-	27	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	48	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition :  $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=30A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



Typical Electrical and Thermal Characteristic Curves

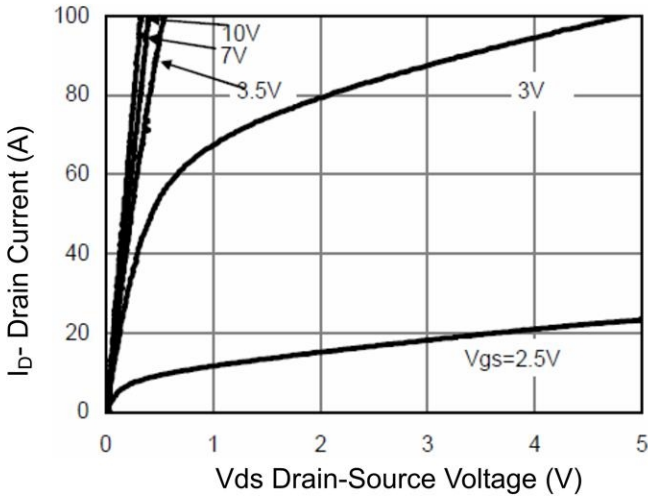


Figure 1 Output Characteristics

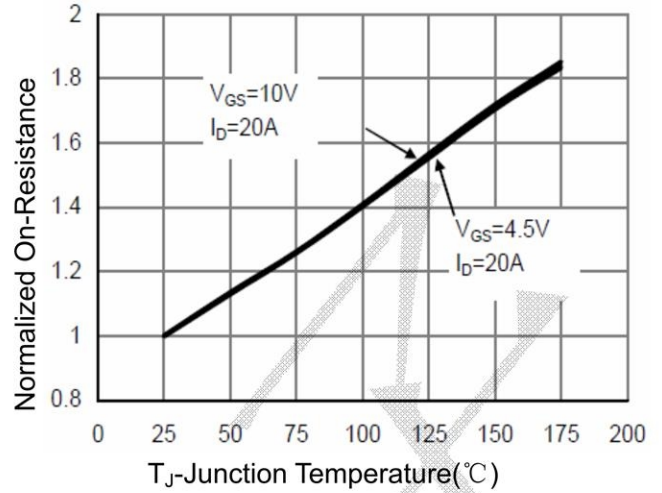


Figure 4 Rdson-Junction Temperature

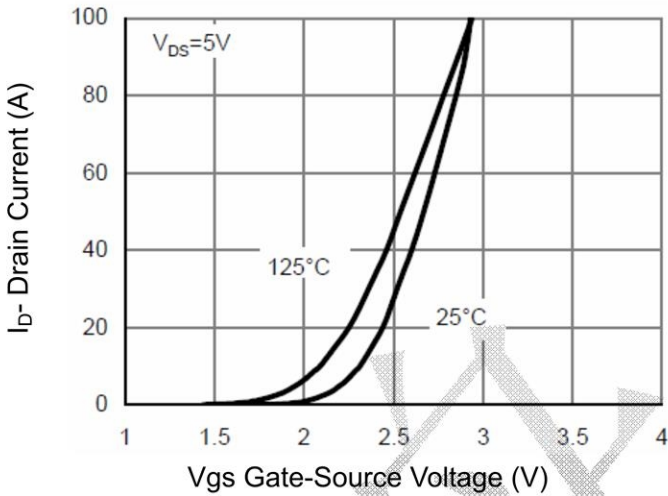


Figure 2 Transfer Characteristics

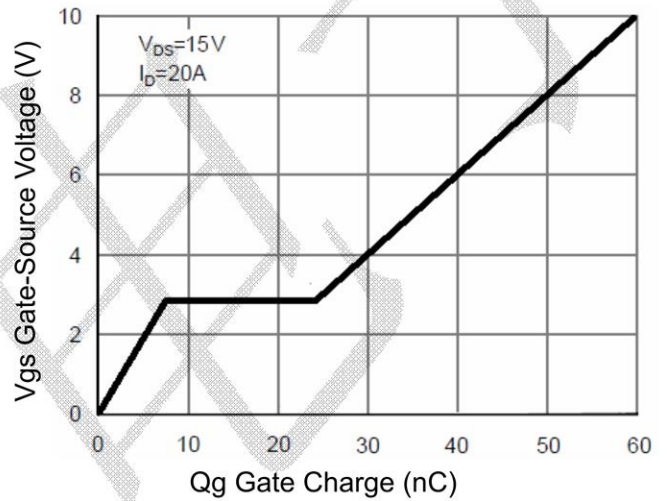


Figure 5 Gate Charge

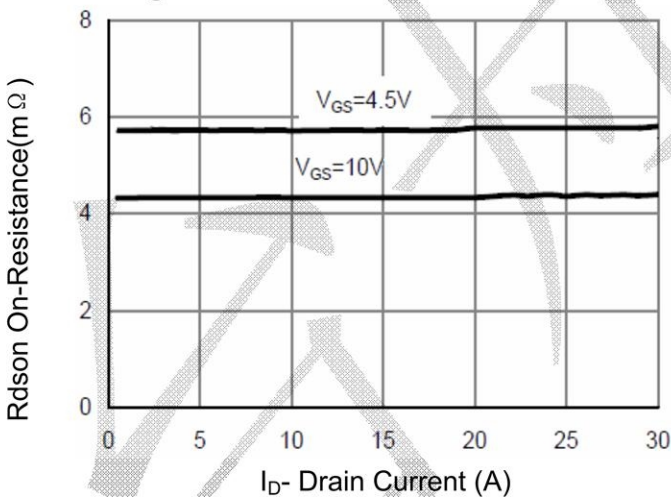


Figure 3 Rdson- Drain Current

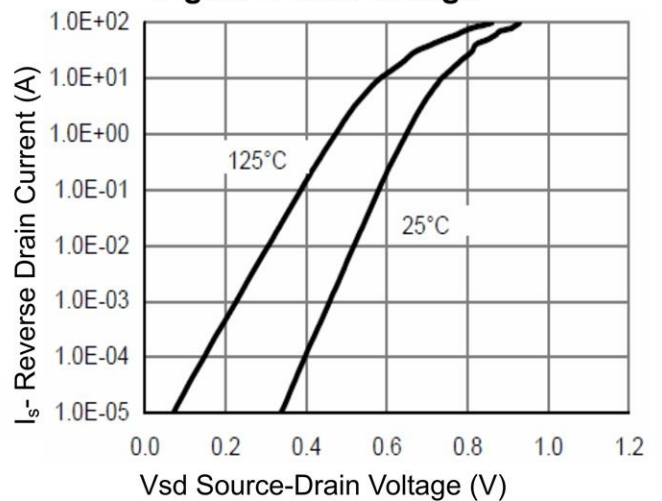
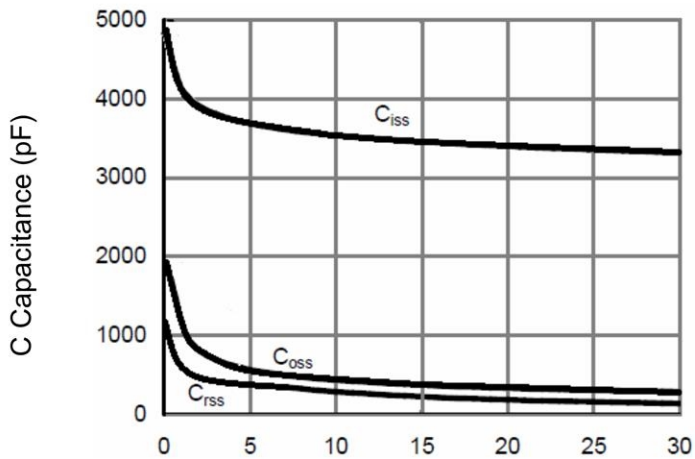
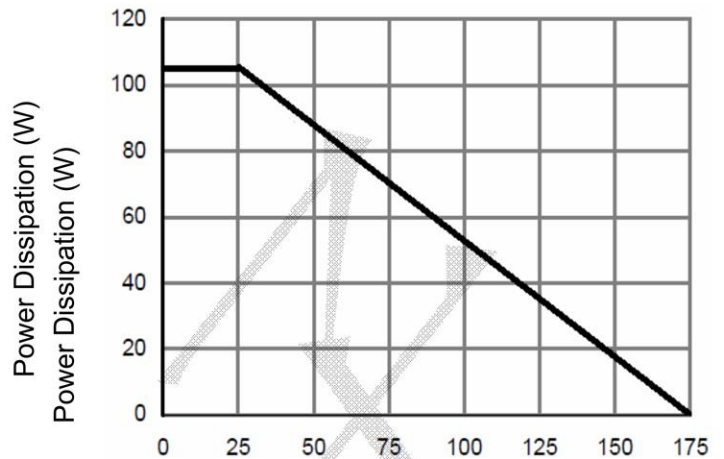


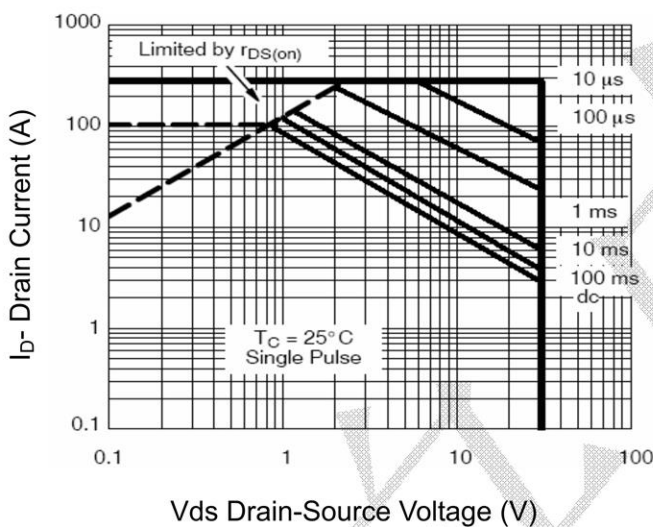
Figure 6 Source- Drain Diode Forward



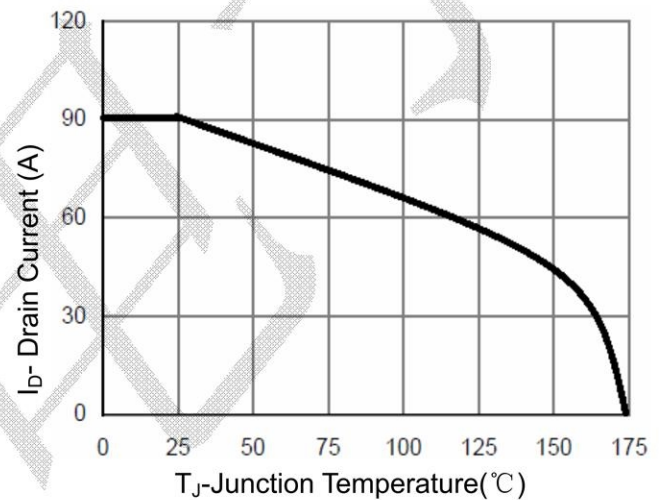
**Figure 7 Capacitance vs Vds**



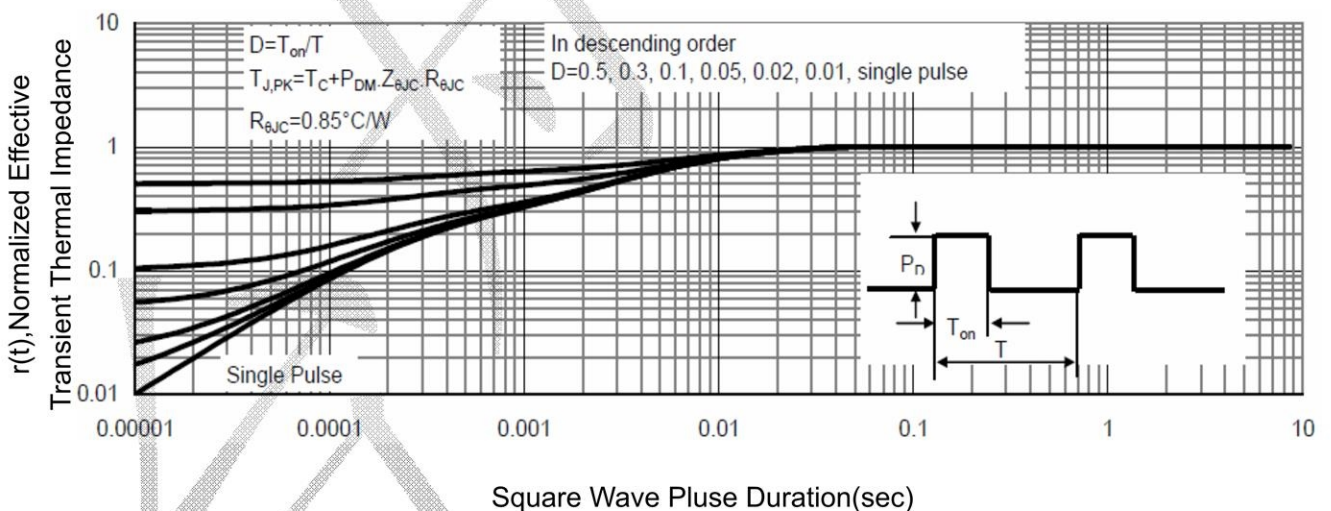
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**



**Figure 10 ID Current Derating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**



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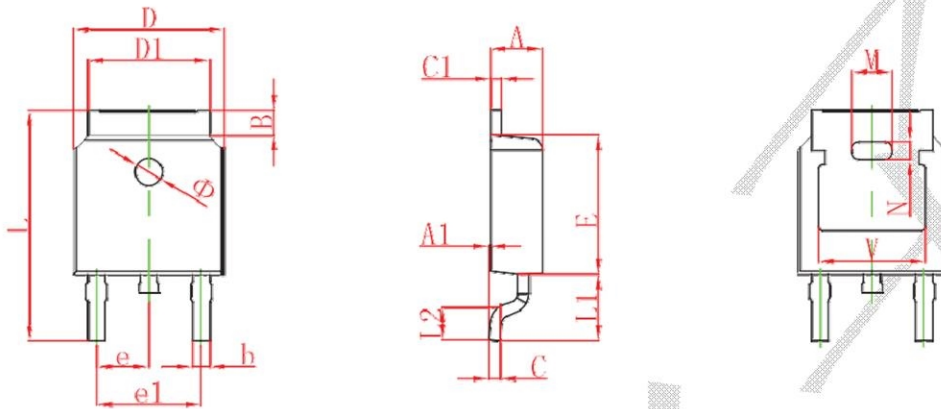
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TPSTD86N3LH5

N-Channel Enhancement Mode Power MOSFET

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TO252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.380	0.087	0.094
A1	0.000	0.100	0.000	0.004
B	0.800	1.400	0.031	0.055
b	0.710	0.810	0.028	0.032
c	0.460	0.560	0.018	0.022
c1	0.460	0.560	0.018	0.022
D	6.500	6.700	0.256	0.264
D1	5.130	5.460	0.202	0.215
E	6.000	6.200	0.236	0.244
e	2.286 TYP.		0.090 TYP.	
e1	4.327	4.727	0.170	0.186
M	1.778 REF.		0.070 REF.	
N	0.762 REF.		0.018 REF.	
L	9.800	10.400	0.386	0.409
L1	2.9 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
V	4.830 REF.		0.190 REF.	
Y	1.100	1.300	0.043	0.051

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