
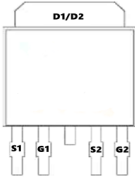
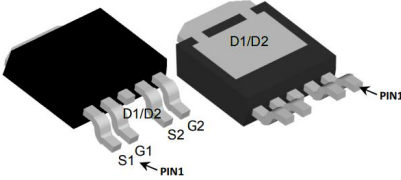
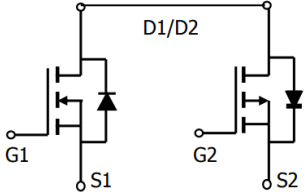


**TM30G04GD**

**N+P-Channel Enhancement Mode Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><b>N Channel</b>  <math>V_{DS} = 40V</math> <math>I_D = 30A</math>  <math>R_{DS(ON)} = 12m\Omega</math> (typ.) @ <math>V_{GS} = 10V</math></p> <p><b>P Channel</b>  <math>V_{DS} = -40V</math> <math>I_D = -28A</math>  <math>R_{DS(ON)} = 29 m\Omega</math> (typ.) @ <math>V_{GS} = -10V</math></p> <p>100% UIS Tested          100% <math>R_g</math> Tested</p> 
--	---

**GD:TO-252-4L**

Marking: 30G04

**Absolute Maximum Ratings:** ( $T_A=25^\circ C$  unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
$V_{DS}$	Drain-Source Voltage	40	-40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D$	Continuous Drain Current- $T_A=25^\circ C$	30	-28	A
	Continuous Drain Current- $T_A=70^\circ C$	19	-16	
	Pulsed Drain Current <sup>(Note 1)</sup>	85	-75	
$P_D$	Power Dissipation - $T_A=25^\circ C$	40	40	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

**Thermal Characteristics:**

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case <sup>(Note2)</sup>	3.1	$^\circ C/W$

**TM30G04GD**
**N+P-Channel Enhancement Mode Mosfet**
**N-CH Electrical Characteristics:** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
<b>BV<sub>DSS</sub></b>	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	40	---	---	V
<b>I<sub>DSS</sub></b>	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=40V$	---	---	1	$\mu\text{A}$
<b>I<sub>GSS</sub></b>	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
<b>V<sub>GS(th)</sub></b>	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1	1.5	2.5	V
<b>R<sub>DS(on)</sub></b>	Drain-Source On Resistance	$V_{GS}=10V, I_D=10A$	---	12	15	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	---	16	20	
<b>G<sub>FS</sub></b>	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	15	---	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
<b>C<sub>iss</sub></b>	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$	---	1470	---	pF
<b>C<sub>oss</sub></b>	Output Capacitance		---	200	---	
<b>C<sub>rss</sub></b>	Reverse Transfer Capacitance		---	125	---	
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
<b>t<sub>d(on)</sub></b>	Turn-On Delay Time	$V_{DD}=20V, R_{GEN}=3\ \Omega$ $R_L=2\ \Omega, V_{GS}=10V$	---	4	---	ns
<b>t<sub>r</sub></b>	Rise Time		---	11.5	---	ns
<b>t<sub>d(off)</sub></b>	Turn-Off Delay Time		---	18	---	ns
<b>t<sub>f</sub></b>	Fall Time		---	5.6	---	ns
<b>Q<sub>g</sub></b>	Total Gate Charge		$V_{GS}=10V, V_{DS}=20V,$ $I_D=10A$	---	24	---
<b>Q<sub>gs</sub></b>	Gate-Source Charge	---		4	---	nC
<b>Q<sub>gd</sub></b>	Gate-Drain Charge	---		3.5	---	nC
<b>Drain-Source Diode Characteristics</b>						
<b>V<sub>SD</sub></b>	Drain Diode Forward Voltage <sup>(Note 3)</sup>	$V_{GS}=0V, I_S=10A$	---	0.8	1.2	V

TM30G04GD

N+P-Channel Enhancement Mode Mosfet

Typical Characteristics: ( $T_c=25^\circ\text{C}$  unless otherwise noted)

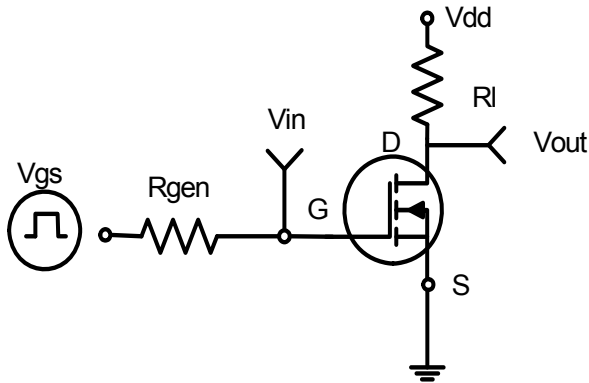


Figure 1: Switching Test Circuit

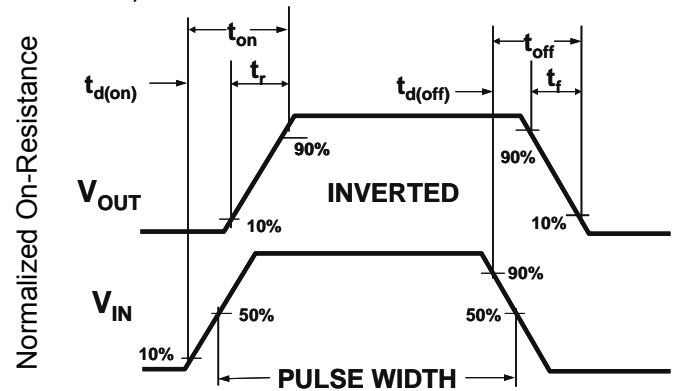


Figure 2: Switching Waveforms

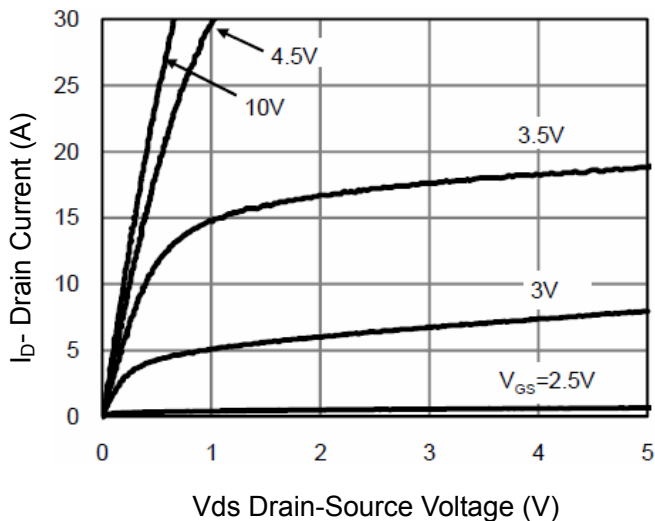


Figure 3 Output Characteristics

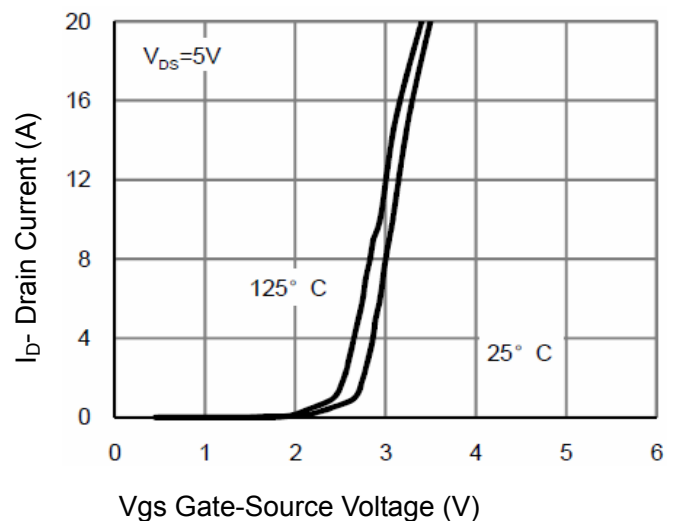


Figure 4 Transfer Characteristics

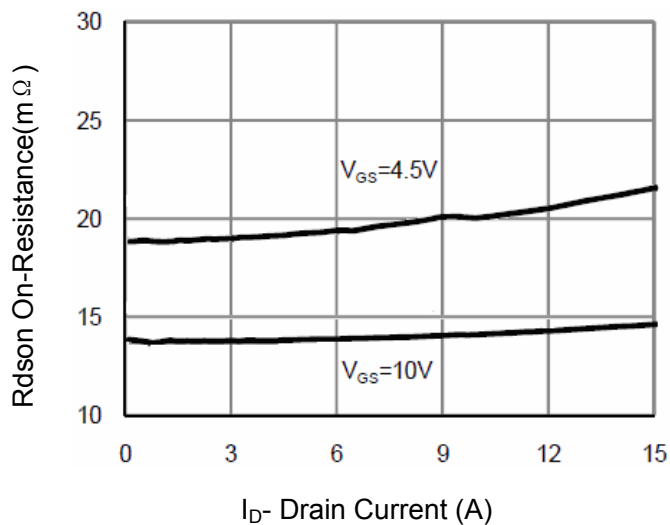


Figure 5 Drain-Source On-Resistance

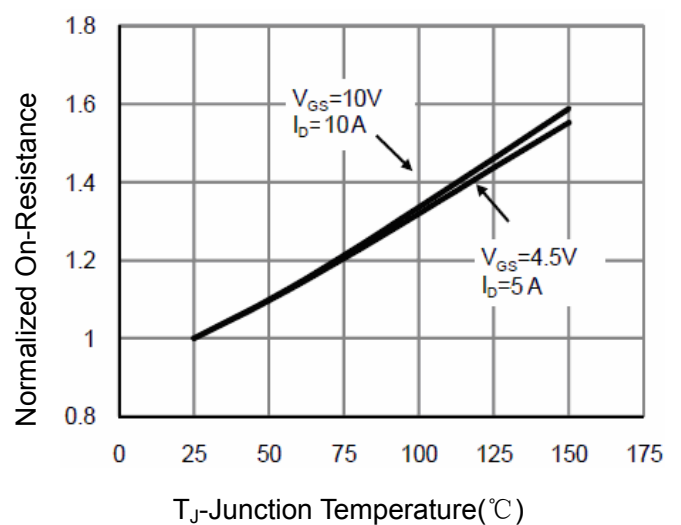
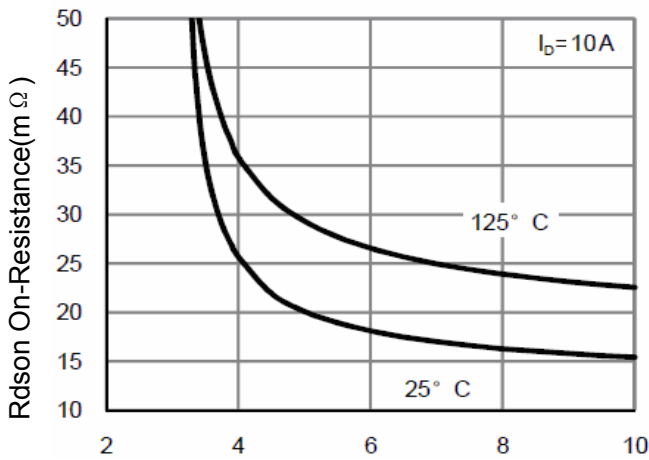


Figure 6 Drain-Source On-Resistance

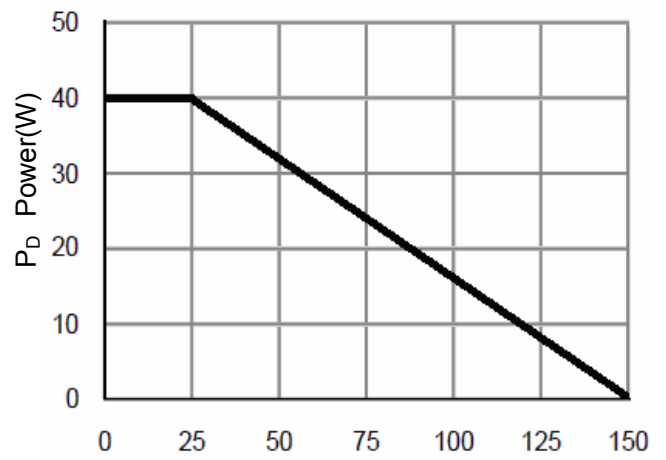


TM30G04GD

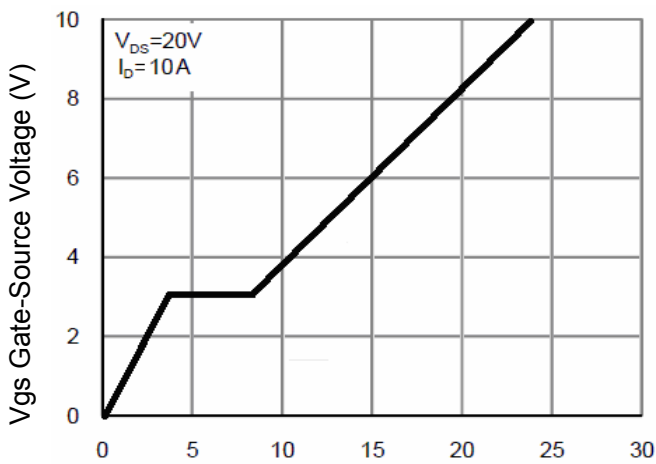
N+P-Channel Enhancement Mode Mosfet



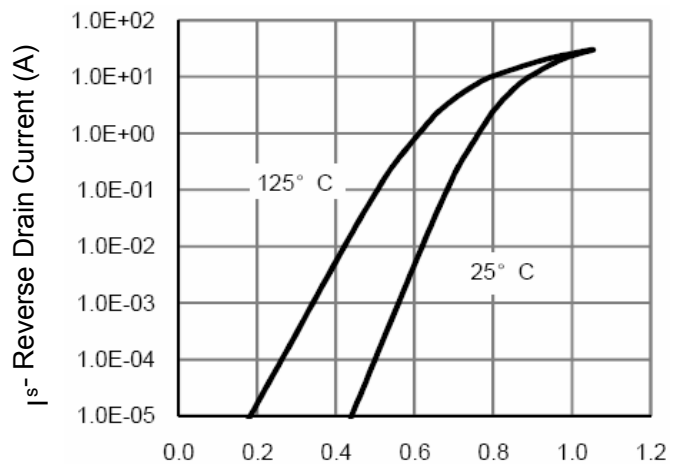
Vgs Gate-Source Voltage (V)  
**Figure 7 Rdson vs Vgs**



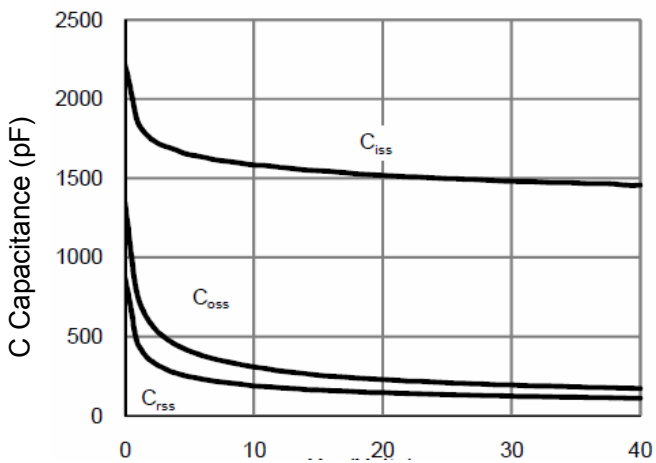
Tj Junction Temperature (°C)  
**Figure 8 Power Dissipation**



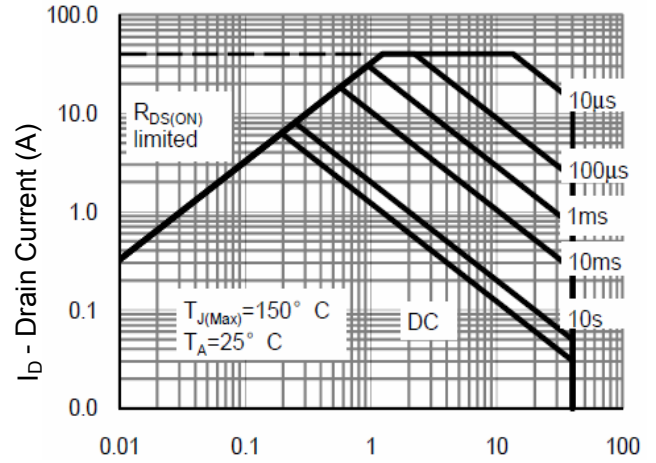
Qg Gate Charge (nC)  
**Figure 9 Gate Charge**



Vds Drain-Source Voltage (V)  
**Figure 10 Source- Drain Diode Forward**



Vds Drain-Source Voltage (V)  
**Figure 11 Capacitance vs Vds**



Vds Drain-Source Voltage (V)  
**Figure 12 Safe Operation Area**



TM30G04GD

N+P-Channel Enhancement Mode Mosfet

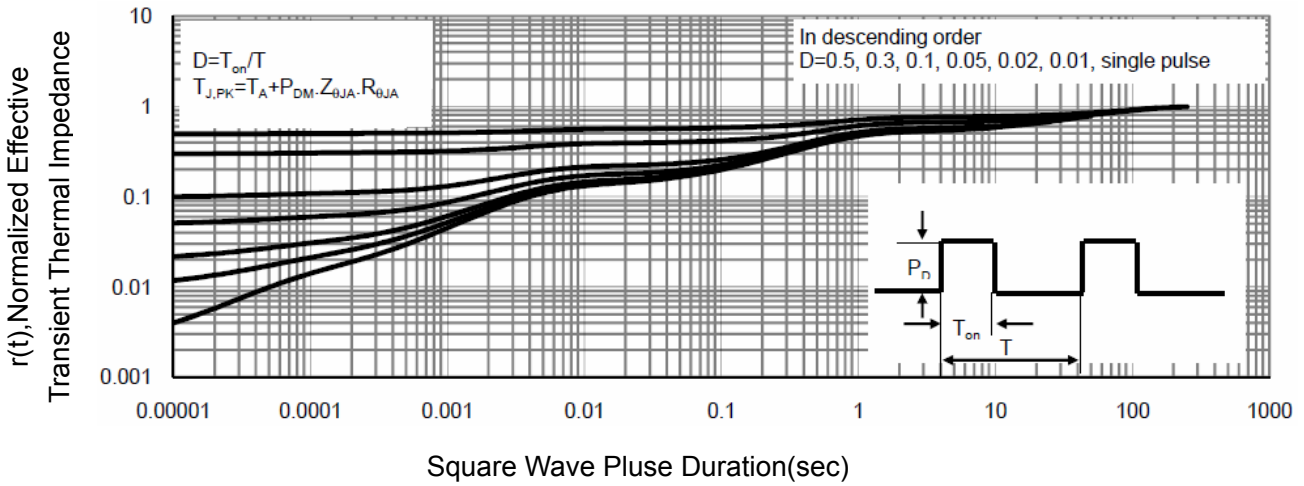


Figure 13 Normalized Maximum Transient Thermal Impedance

**TM30G04GD**

**N+P-Channel Enhancement Mode Mosfet**

**P-CH Electrical Characteristics:** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
<b>BV<sub>DSS</sub></b>	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-40	---	---	V
<b>I<sub>DSS</sub></b>	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-40V$	---	---	-1	$\mu\text{A}$
<b>I<sub>GSS</sub></b>	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
<b>V<sub>GS(th)</sub></b>	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-1	-1.5	-2	V
<b>R<sub>DS(ON)</sub></b>	Drain-Source On Resistance	$V_{GS}=-10V, I_D=-7A$	---	29	36	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	---	37	45	
<b>G<sub>FS</sub></b>	Forward Transconductance	$V_{DS}=-5V, I_D=-7A$	---	15	---	S
<b>Dynamic Characteristics</b> (Note 4)						
<b>C<sub>iss</sub></b>	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$	---	1200	---	pF
<b>C<sub>OSS</sub></b>	Output Capacitance		---	185	---	
<b>C<sub>rss</sub></b>	Reverse Transfer Capacitance		---	110	---	
<b>Switching Characteristics</b> (Note 4)						
<b>t<sub>d(on)</sub></b>	Turn-On Delay Time	$V_{DD}=-20V, R_L=2.3\ \Omega$ $R_{GEN}=6\ \Omega, V_{GS}=-10V$	---	10	---	ns
<b>t<sub>r</sub></b>	Rise Time		---	15	---	ns
<b>t<sub>d(off)</sub></b>	Turn-Off Delay Time		---	30	---	ns
<b>t<sub>f</sub></b>	Fall Time		---	18	---	ns
<b>Q<sub>g</sub></b>	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-20V,$ $I_D=-7A$	---	21	---	nC
<b>Q<sub>gs</sub></b>	Gate-Source Charge		---	3.5	---	nC
<b>Q<sub>gd</sub></b>	Gate-Drain Charge		---	3	---	nC
<b>Drain-Source Diode Characteristics</b>						
<b>V<sub>SD</sub></b>	Drain Diode Forward Voltage (Note 3)	$V_{GS}=0V, I_S=-14A$	---	---	-1.2	V

**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  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

TM30G04GD

N+P-Channel Enhancement Mode Mosfet

Typical Characteristics: ( $T_c=25^\circ\text{C}$  unless otherwise noted)

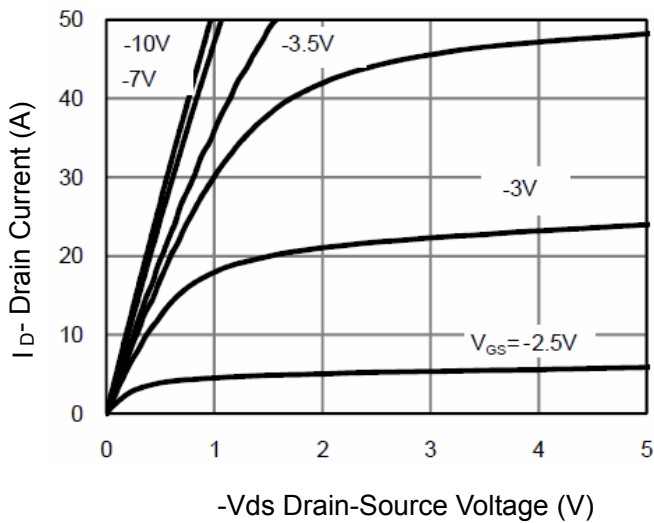


Figure 1 Output Characteristics

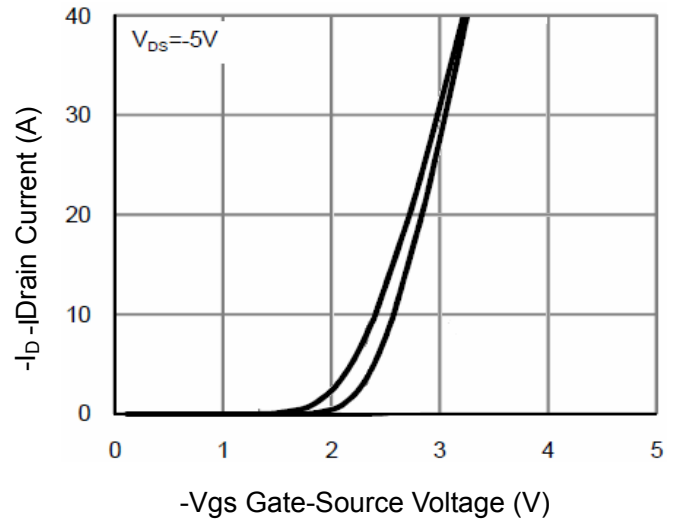


Figure 2 Transfer Characteristics

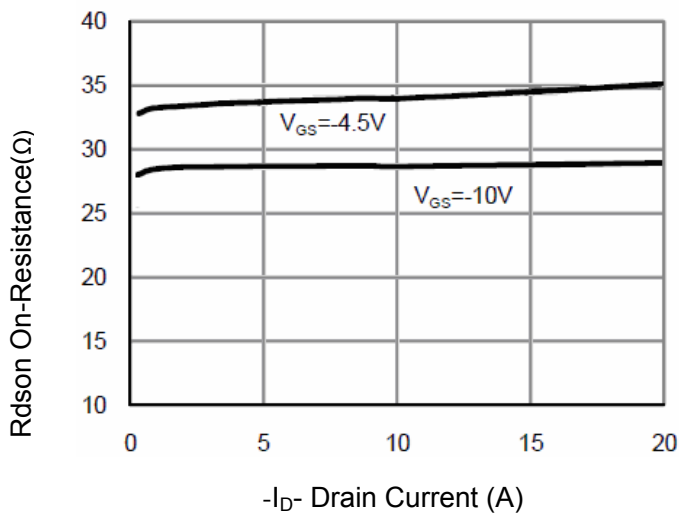


Figure 3 Rdson- Drain Current

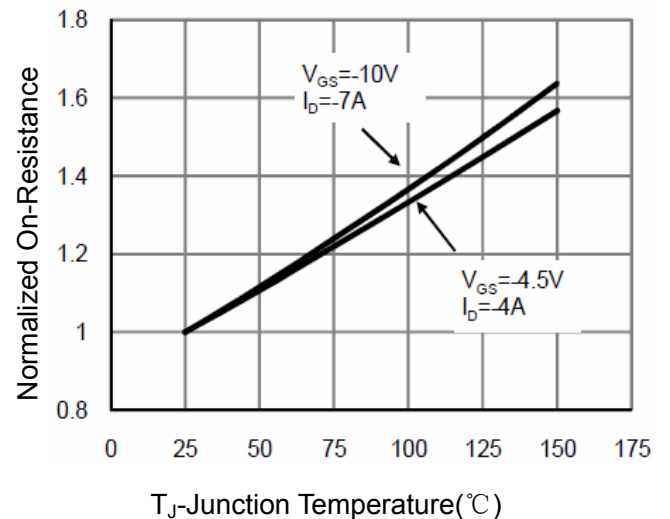


Figure 4 Rdson-Junction Temperature

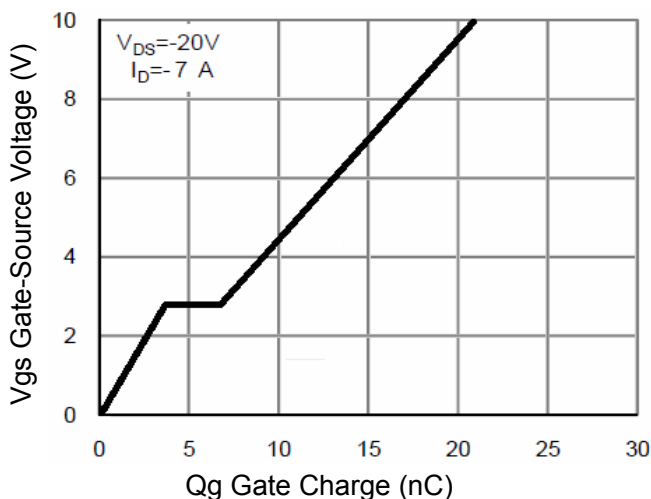


Figure 5 Gate Charge

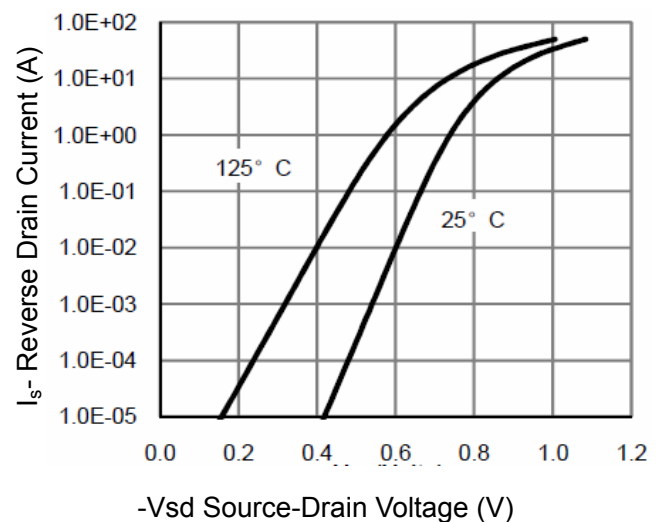


Figure 6 Source- Drain Diode Forward

TM30G04GD

N+P-Channel Enhancement Mode Mosfet

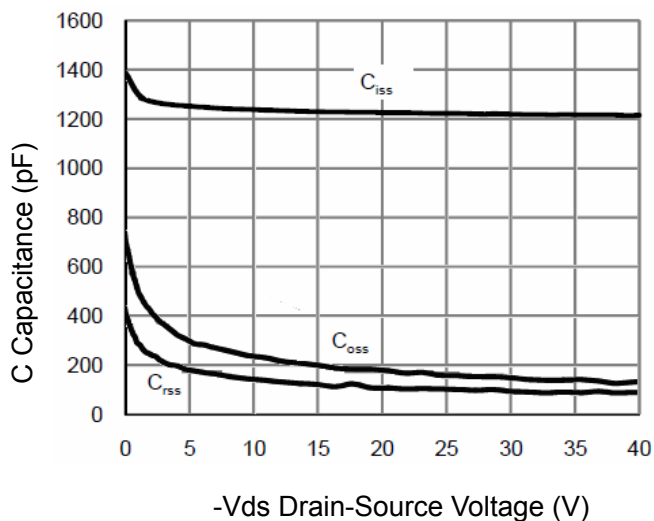


Figure 7 Capacitance vs Vds

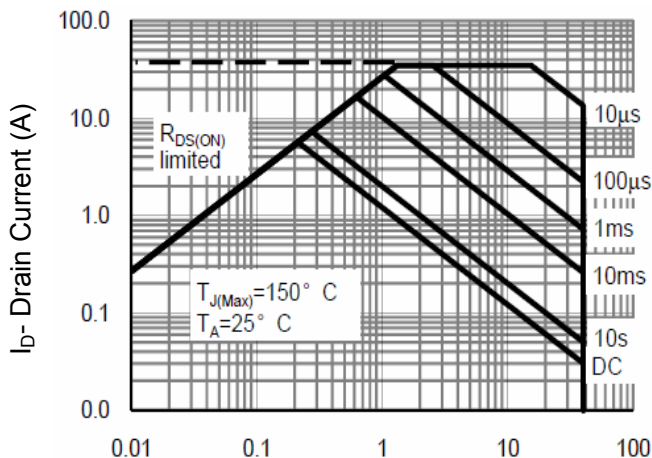


Figure 8 Safe Operation Area

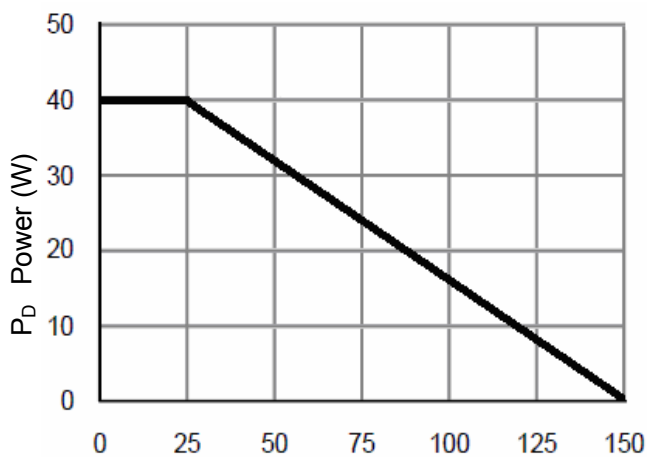


Figure 9 Power Dissipation

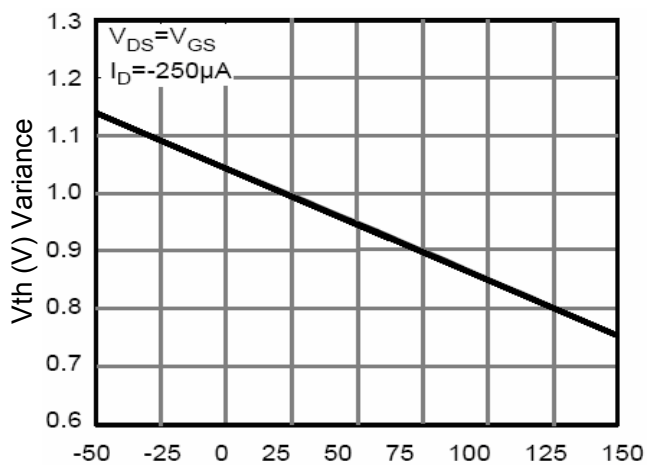


Figure 10 VGS(th) vs Junction Temperature

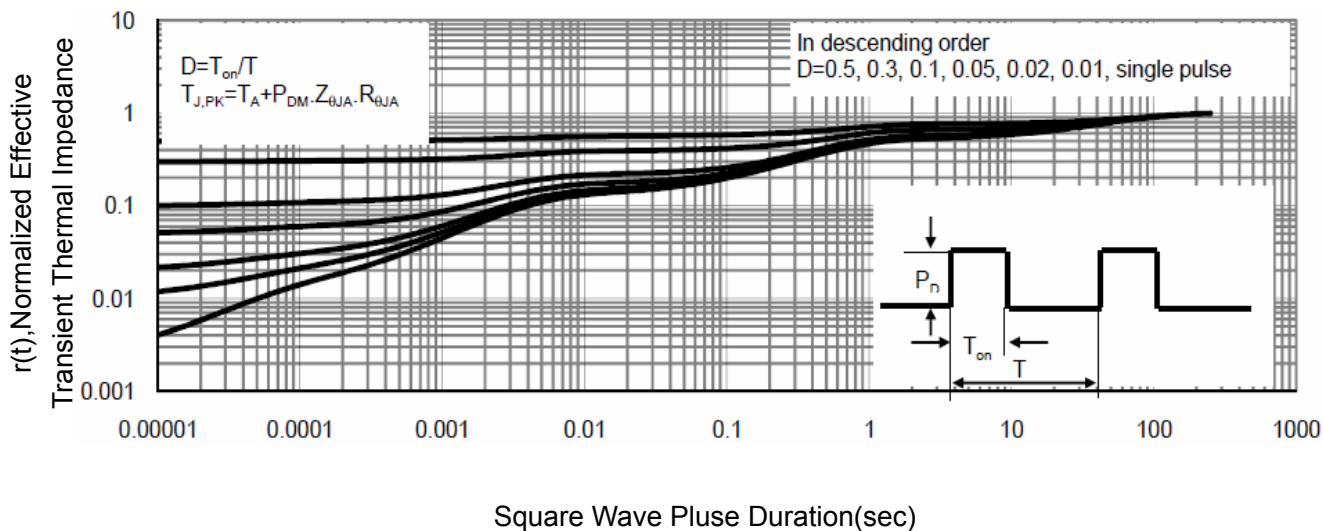
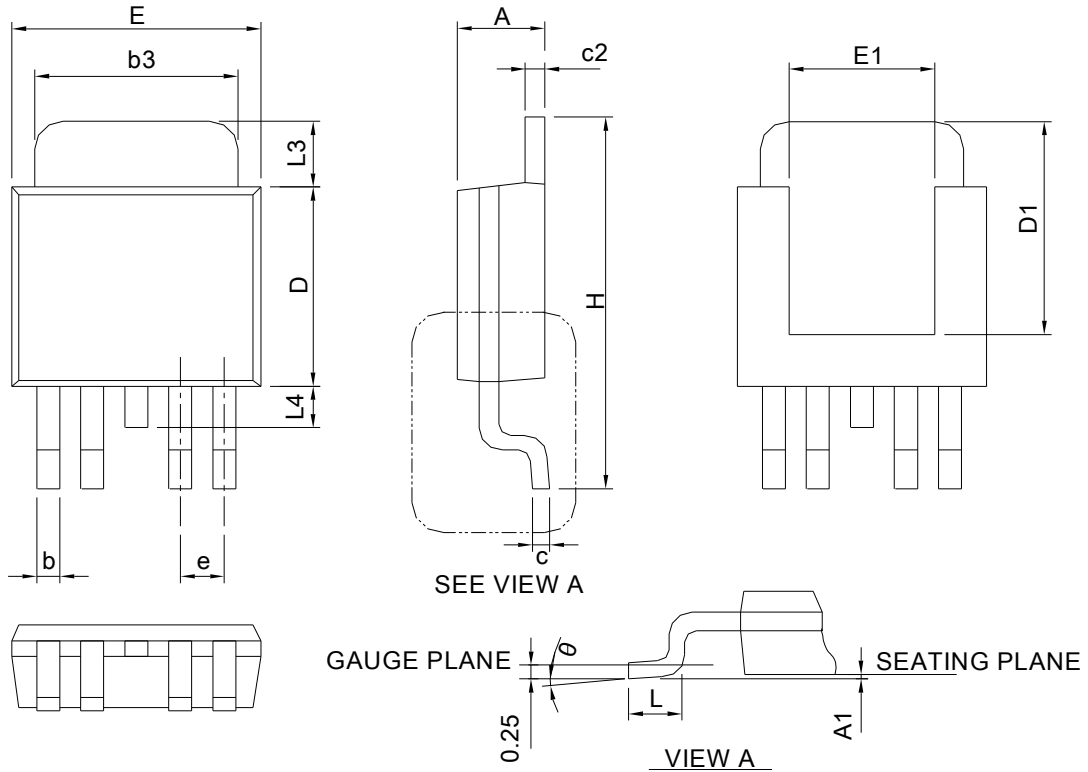


Figure 11 Normalized Maximum Transient Thermal Impedance

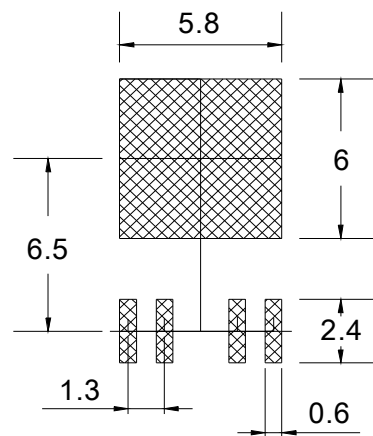


# Package Mechanical Data:TO-252-4L



SYMBOL	TO-252-4			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.2	-	0.008
b	0.50	0.71	0.020	0.028
b3	4.32	5.46	0.170	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	1.30 BSC		0.051 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
$\theta$	0°	8°	0°	8°

## RECOMMENDED LAND PATTERN



UNIT: mm