
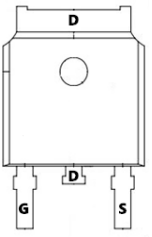


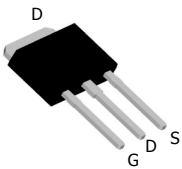
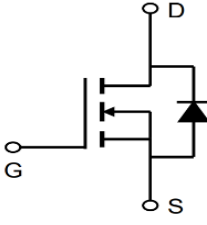
TMN6050Y

N-Channel Enhancement 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><math>V_{DS} = 60V</math> <math>I_D = 50A</math></p> <p><math>R_{DS(ON)} = 13 m\Omega</math> (typ.) @ <math>V_{GS} = 10V</math></p> <p>100% UIS Tested              100% <math>R_g</math> Tested</p> 
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**Y:TO-251S-3L**

Marking: 50N06

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

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	60	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	50
		$T_C = 100^\circ C$	23
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>	180	A
EAS	Single Pulsed Avalanche Energy <sup>note2</sup>	280	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ C$	87.7
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.6	$^\circ C/W$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^\circ C$

**Thermal Characteristic**

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.76	$^\circ C/W$
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**Electrical Characteristics ( $T_C=25^\circ\text{C}$  unless otherwise noted)**

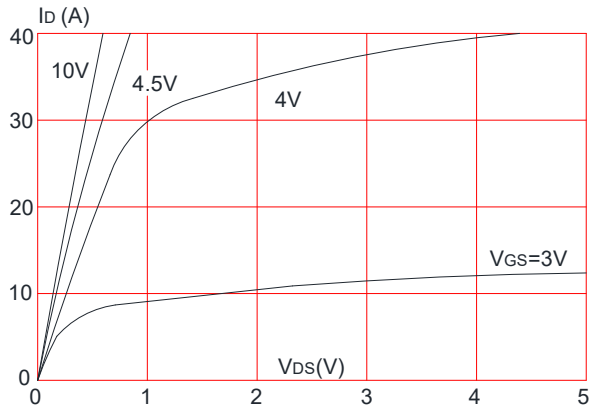
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$	-	13	16	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=30A$	30	-	-	S
<b>Dynamic Characteristics (Note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	2498	-	PF
Output Capacitance	$C_{oss}$		-	185	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	80	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=1\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	12	-	nS
Turn-on Rise Time	$t_r$		-	5.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	$t_f$		-	27	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	36	-	nC
Gate-Source Charge	$Q_{gs}$		-	9.9	-	nC
Gate-Drain Charge	$Q_{gd}$		-	6.6	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=30A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	50	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}, I_F = 30A$ $di/dt = 100A/\mu s$ (Note 3)	-	35		nS
Reverse Recovery Charge	$Q_{rr}$		-	47		nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

**Notes:**

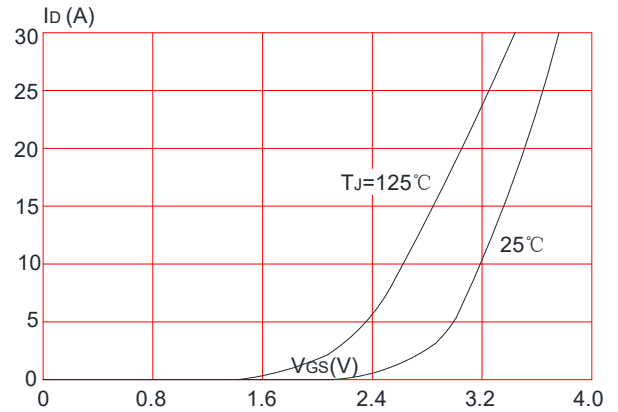
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $E_{AS}$  condition:  $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

### Typical Performance Characteristics

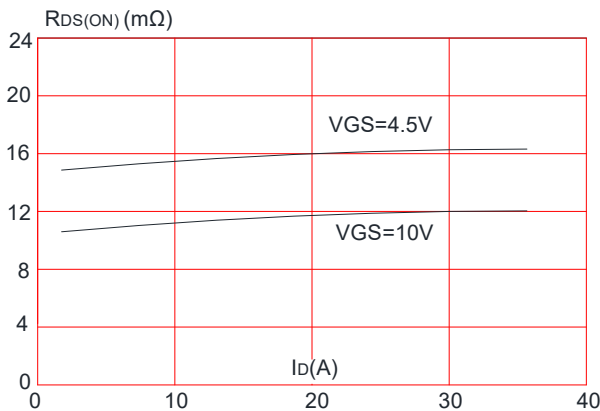
**Figure 1: Output Characteristics**



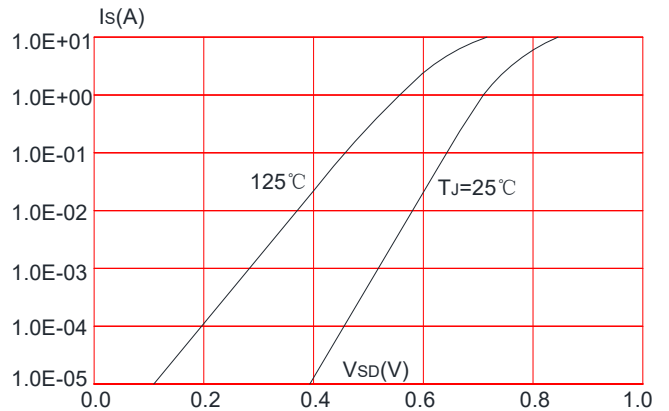
**Figure 2: Typical Transfer Characteristics**



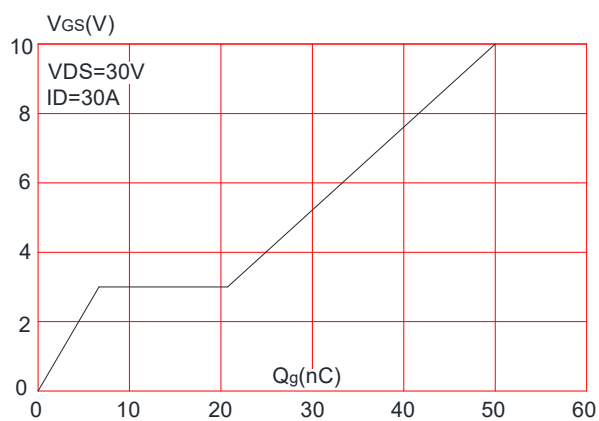
**Figure 3: On-resistance vs. Drain Current**



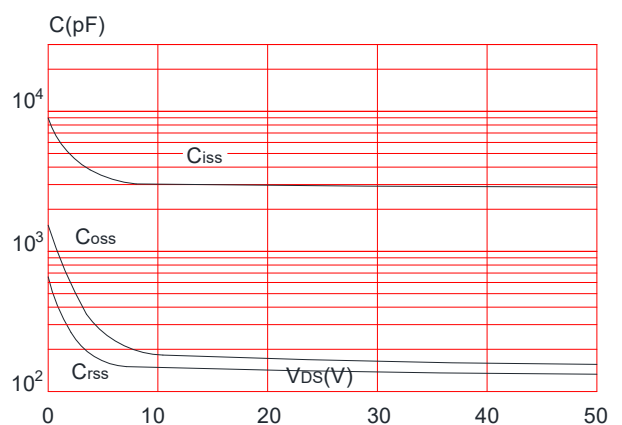
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



**Figure 6: Capacitance Characteristics**



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

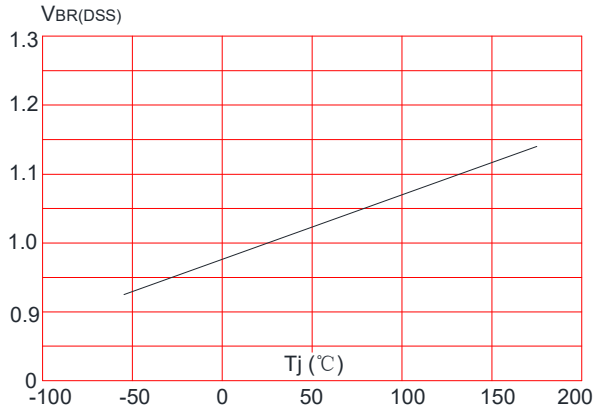


Figure 8: Normalized on Resistance vs. Junction Temperature

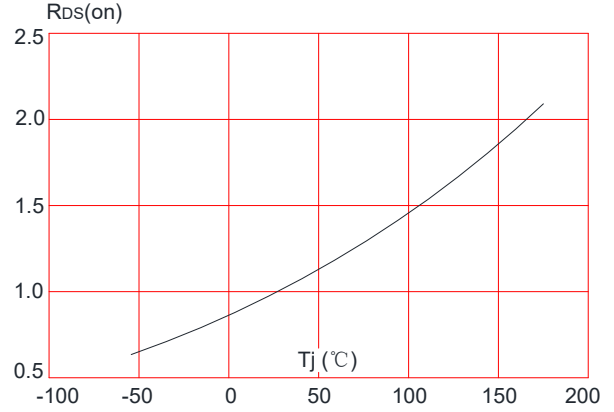


Figure 9: Maximum Safe Operating Area

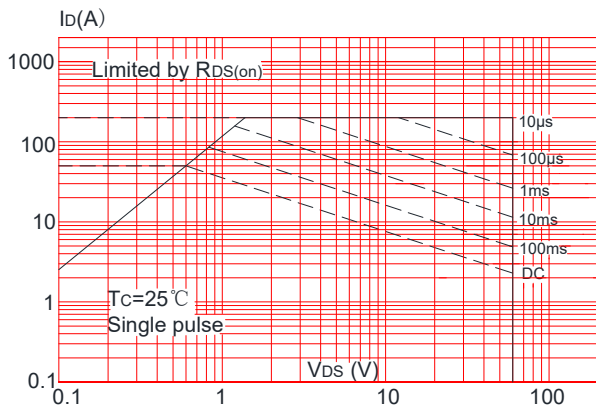


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

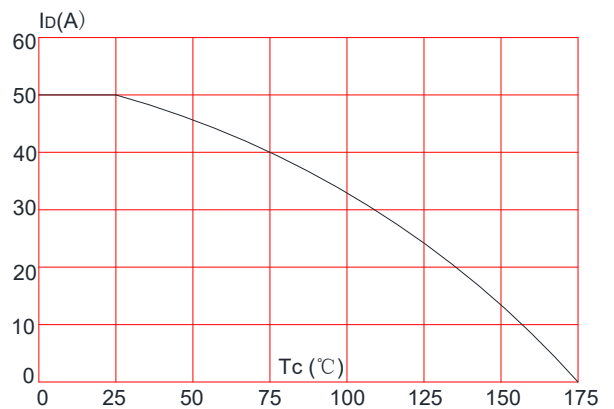
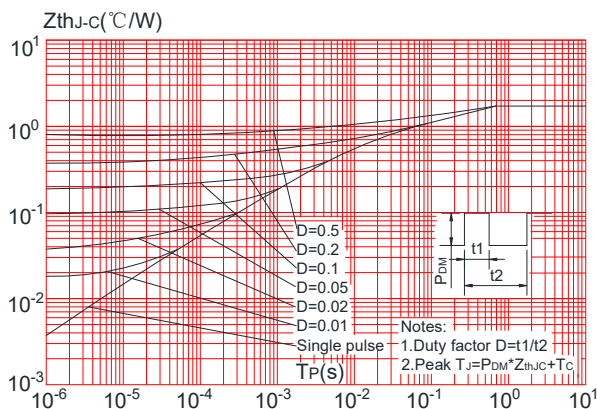


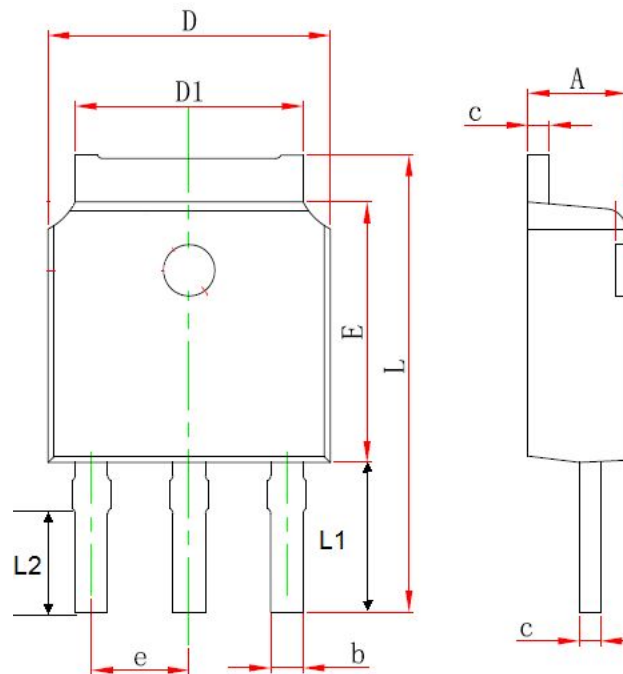
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Package Information:TO-251S-3L

UNIT: mm

SYMBOL	min	nom	max
A	2.20		2.40
b	0.50		0.85
C	0.45	0.50	0.60
D	6.50		6.70
D1	5.10		5.50
E	5.9		6.20
e	2.18	2.29	2.38
L	11.00		12.40
L1	4.8		5.3
L2	3.5		4.2



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