TMD6040
N-CHANNEL ENHANCEMENT MOSFET

General Description

- Latest Trench Power MOSFET technology
- Very Low RDS(on) at 10VGS
- Low Gate Charge
- High Current Capability

Application

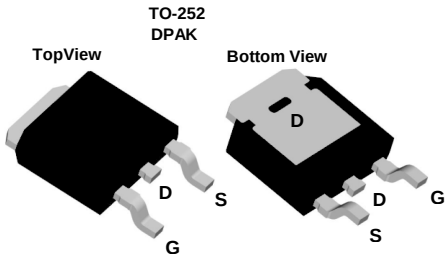
- DC/DC Converters in Computing
- Isolated DC/DC Converters in Telecom and Industrial

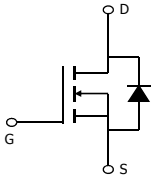
Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	15A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 40mΩ

100% UIS Tested
100% R_g Tested

RoHS Compliant





Absolute Maximum Ratings at T_a=25^{0}C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V_{DSS}		60	V
Gate-to-Source Voltage	V_{GSS}		±20	V
Drain Current (DC)	I_D		15	A
Drain Current (Pulse)	I_{DP}	PW≤10uS, duty cycle≤1%	50	A
Allowable Power Dissipation	P_D	Mounted on a ceramic board (1000mm^2×0.8mm) 1unit	40	W
Total Dissipation	P_T	Mounted on a ceramic board (1000mm^2×0.8mm)	40	W
Channel Temperature	T_{ch}		150	^{0}C
Storage Temperature	T_{stg}		-55~+150	^{0}C

Electrical Characteristics at T_a=25^{0}C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=250uA, V_{GS}=0V	60	66	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	uA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}= V_{GS}, I_D=250uA	1	1.70	2.5	V
Static Drain-to-Source On-State Resistance	$R_{DS(ON)}$	I_D=15A, V_{GS}=10V	-	30	40	mΩ
	$R_{DS(ON)}$	I_D=7A, V_{GS}=4.5V	-	33	50	mΩ
Input Capacitance	C_{iss}	V_{DS}=30V, V_{GS}=0V, f=1MHz	-	510	-	pF
Output Capacitance	C_{oss}	V_{DS}=30V, V_{GS}=0V, f=1MHz	-	60	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{DS}=30V, V_{GS}=0V, f=1MHz	-	23	-	pF

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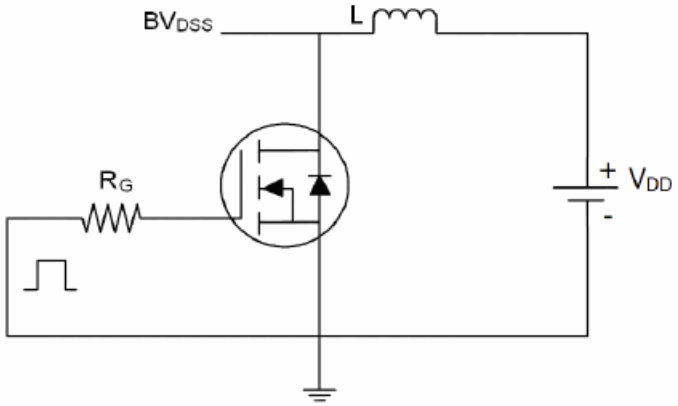
Electrical Characteristics at T_a=25^{0}C (Continued)

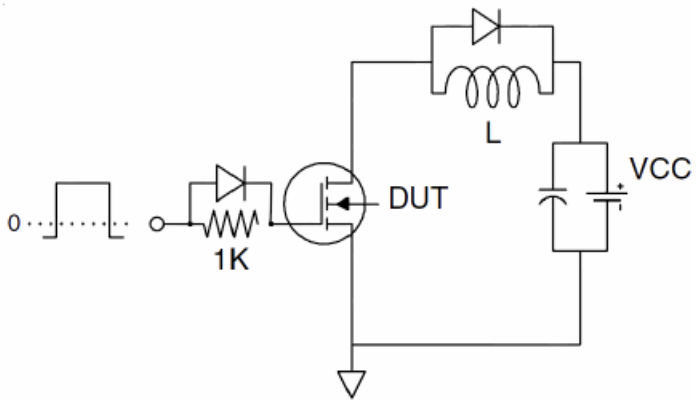
Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	max	
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=30V, I_D=1.5A, R_{GEN}=1Ω, V_{GS}=10V	-	6	-	nS
Rise Time	t_r		-	3	-	nS
Turn-off Delay Time	$t_{d(off)}$		-	16	-	nS
Fall Time	t_f		-	2.8	-	nS
Total Gate Charge	Q_g	V_{DS}=30V, V_{GS}=4.5V, I_D=3A	-	11	-	nC
Gate-to-Source Charge	Q_{gs}		-	5	-	nC
Gate-to-Drain “Miller” Charge	Q_{gd}		-	4.8	-	nC
Diode Forward Voltage	V_{SD}	I_S=3A, V_{GS}=0V	-	0.88	1.2	V

Test circuit

1) E_{AS} test Circuits



2) Gate charge test Circuit:



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Typical Characteristics at $T_a=25^0C$

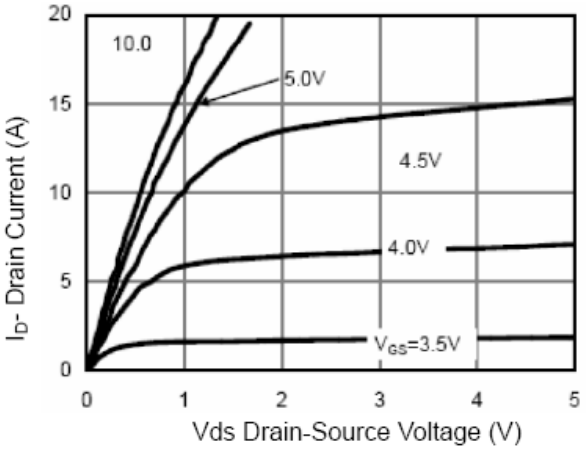

Figure 1 Output Characteristics

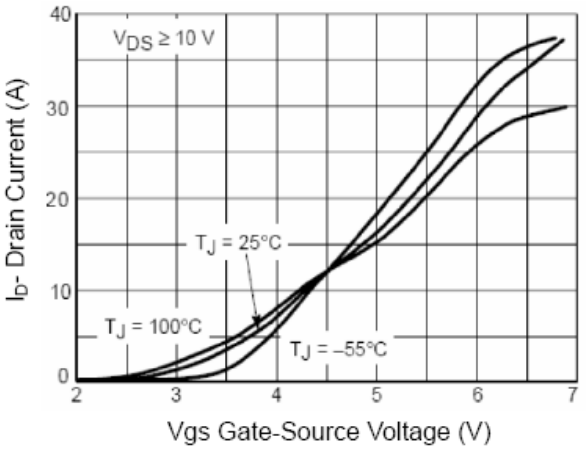

Figure 2 Transfer Characteristics

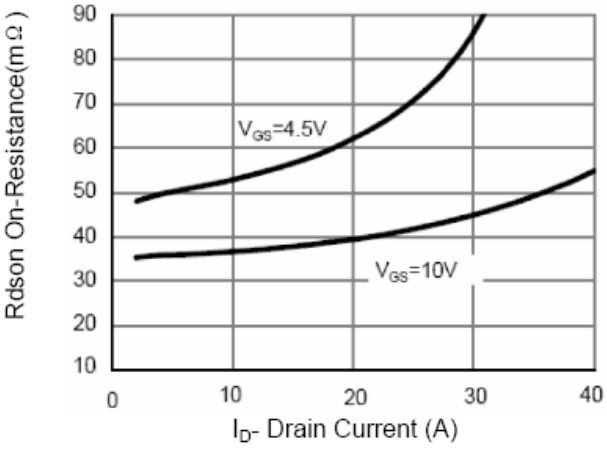

Figure 3 Rdson- Drain Current

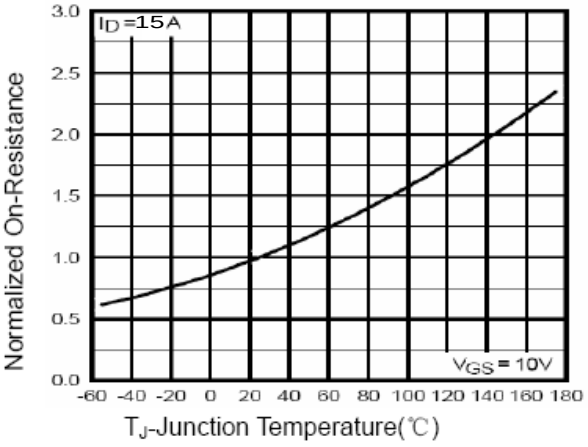

Figure 4 Rdson-JunctionTemperature

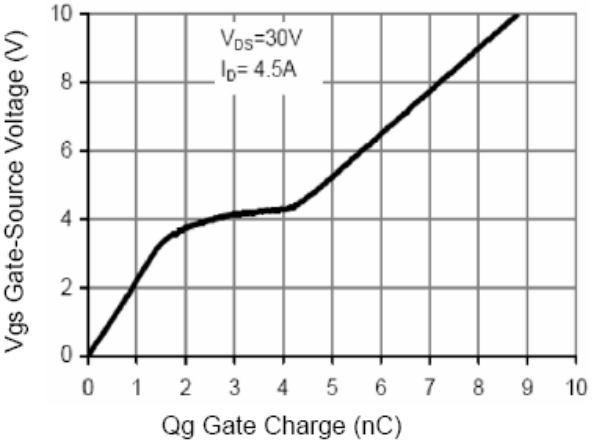

Figure 5 Gate Charge

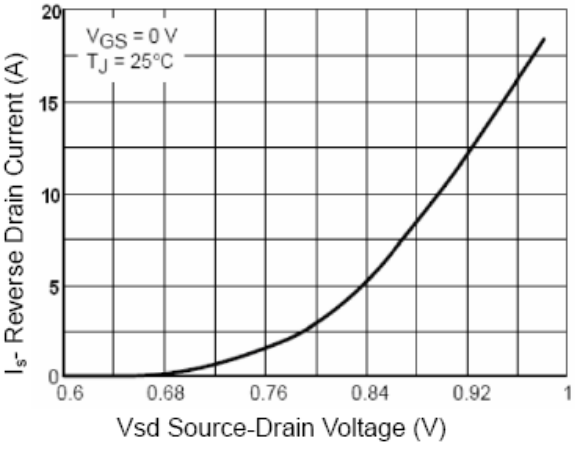

Figure 6 Source- Drain Diode Forward

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Typical Characteristics at $T_a=25^0C$ (Continued)

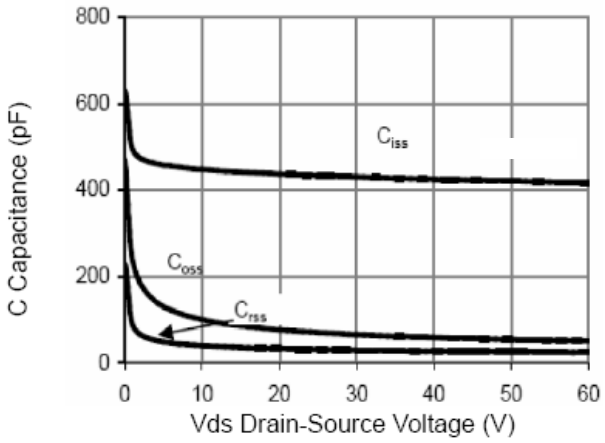

Figure 7 Capacitance vs Vds

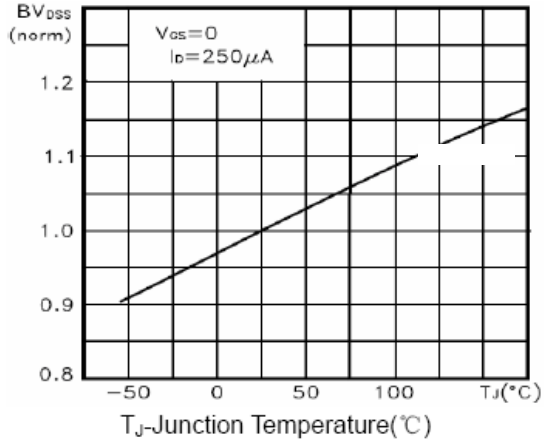

Figure 9 BV_{DSS} vs Junction Temperature

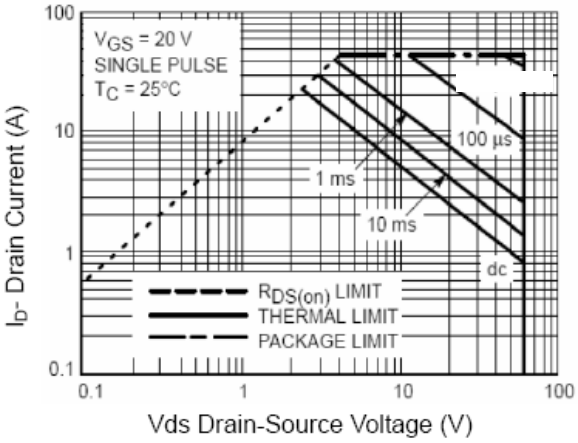

Figure 8 Safe Operation Area

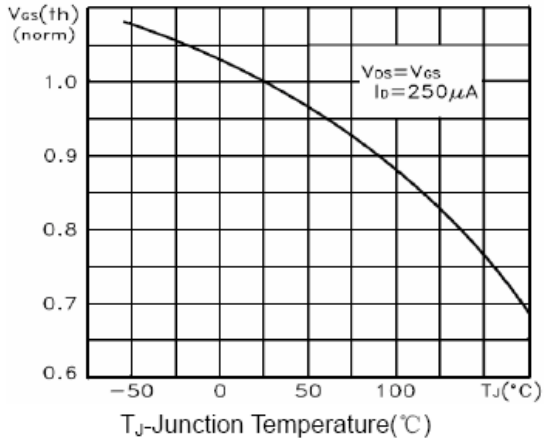

Figure 10 $V_{GS(th)}$ vs Junction Temperature

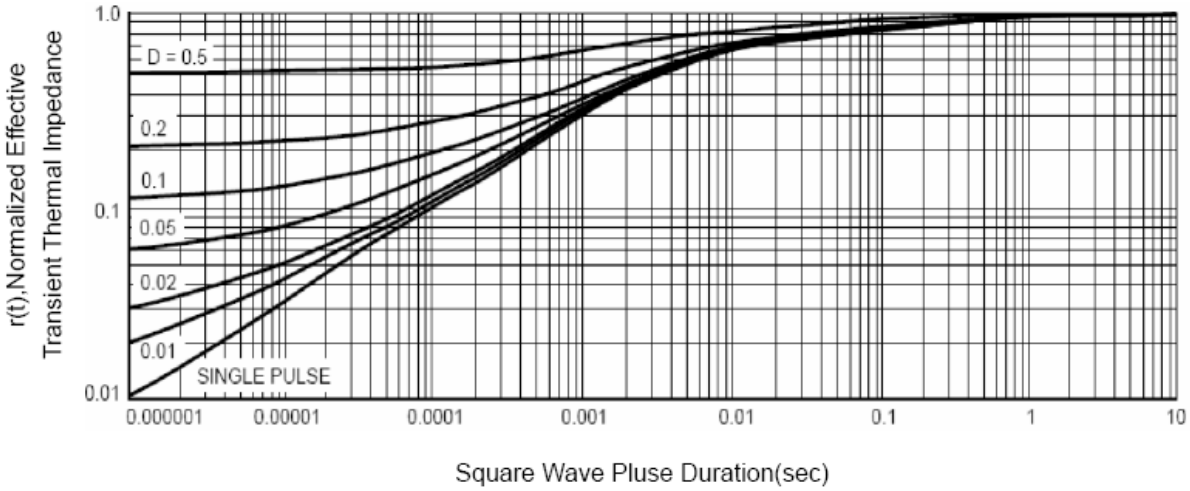

Figure 11 Normalized Maximum Transient Thermal Impedance

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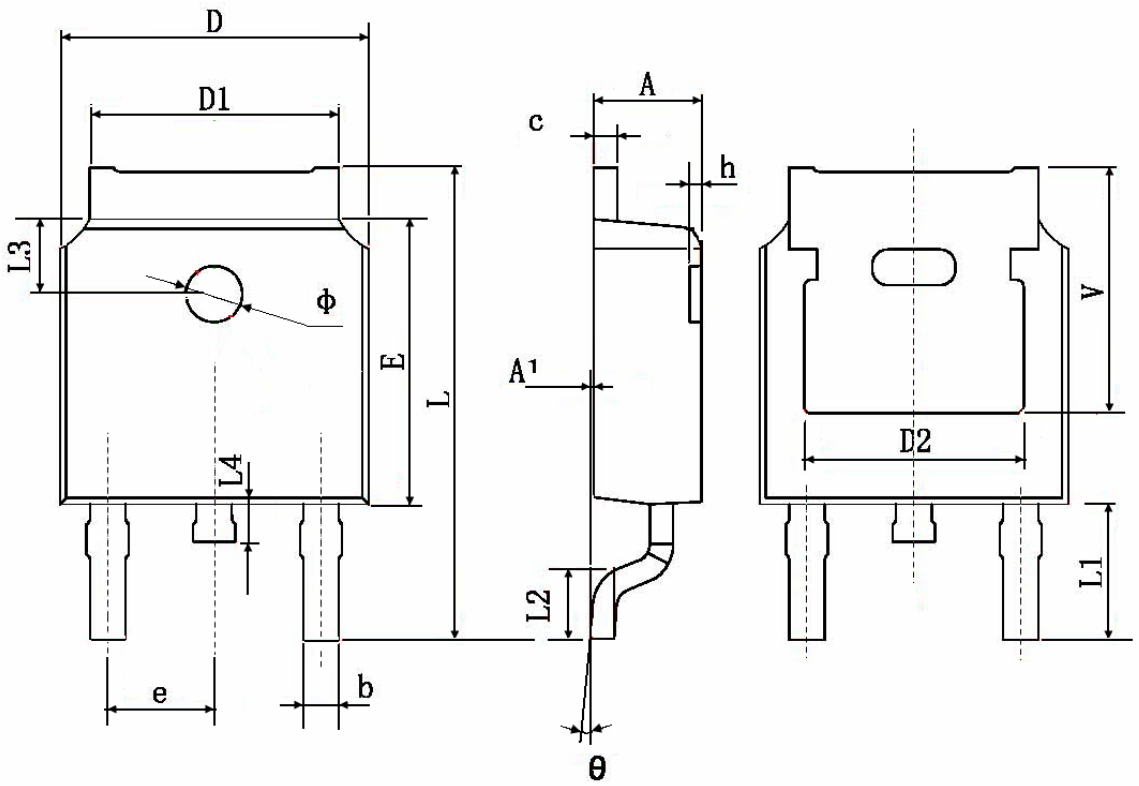
TO-252 Package Information



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 TYP.		0.190 TYP.	
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 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
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 TYP.		0.211 TYP.	

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