

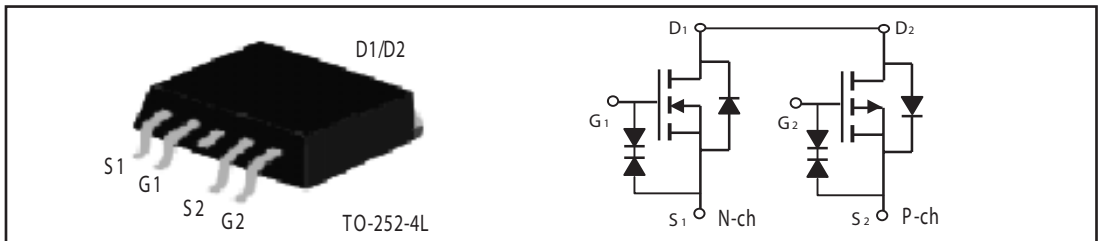


STU312D

Dual Enhancement Mode Field Effect Transistor (N and P Channel)

PRODUCT SUMMARY (N-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (m Ω) Max
30V	18A	24 @ V _{GS} = 10V
		36 @ V _{GS} = 4.5V

PRODUCT SUMMARY (P-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (m Ω) Max
-30V	-14A	34 @ V _{GS} = -10V
		54 @ V _{GS} = -4.5V



ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V _{DS}	30	-30	V
Gate-Source Voltage		V _{GS}	±24	±24	V
Drain Current-Continuous @ T _c	25°C	I _D	18	-14	A
	70°C		15	-12	A
-Pulsed ^a		I _{DM}	50	-50	A
Drain-Source Diode Forward Current		I _S	10	-6	A
Maximum Power Dissipation	T _c = 25°C	P _D	11		W
	T _c = 70°C		7.7		
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 175		°C

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Case	R _{θJC}	13.6	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	120	°C/W

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N-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=24V, V_{GS}=0V$			1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 24V, V_{DS}=0V$			± 100	μA
ON CHARACTERISTICS^a						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.8	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$		18	24	m ohm
		$V_{GS}=4.5V, I_D=8A$		24	36	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS}=5V, V_{GS}=4.5V$	20			A
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=10A$		15		S
DYNAMIC CHARACTERISTICS^b						
Input Capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V$ $f=1.0MHz$		640		pF
Output Capacitance	C_{OSS}			180		pF
Reverse Transfer Capacitance	C_{RSS}			110		pF
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$		0.5		ohm
SWITCHING CHARACTERISTICS^b						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=15V$ $I_D=1A$ $V_{GS}=10V$ $R_{GEN}=6\text{ ohm}$		13		ns
Rise Time	t_r			12		ns
Turn-Off Delay Time	$t_{D(OFF)}$			40		ns
Fall Time	t_f			7		ns
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=20A, V_{GS}=10V$		13		nC
		$V_{DS}=15V, I_D=20A, V_{GS}=4.5V$		6.8		nC
Gate-Source Charge	Q_{gs}	$V_{DS}=15V, I_D=20A$		1.5		nC
Gate-Drain Charge	Q_{gd}	$V_{GS}=10V$		3.5		nC

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P-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24V, V_{GS}=0V$			-1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 24V, V_{DS}=0V$			± 100	μA
ON CHARACTERISTICS^a						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.7	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-6A$		27	34	m ohm
		$V_{GS}=-4.5V, I_D=-4A$		39	54	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS}=-5V, V_{GS}=-10V$	-20			A
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-6A$		10		S
DYNAMIC CHARACTERISTICS^b						
Input Capacitance	C_{ISS}	$V_{DS}=-15V, V_{GS}=0V$ $f=1.0MHz$		800		pF
Output Capacitance	C_{OSS}			215		pF
Reverse Transfer Capacitance	C_{RSS}			120		pF
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$		4		ohm
SWITCHING CHARACTERISTICS^b						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=-15V$ $I_D=-1A$ $V_{GS}=-10V$ $R_{GEN}=6\text{ ohm}$		12		ns
Rise Time	t_r			18		ns
Turn-Off Delay Time	$t_{D(OFF)}$			68		ns
Fall Time	t_f			38		ns
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-20A, V_{GS}=-10V$		15		nC
		$V_{DS}=-15V, I_D=20A, V_{GS}=-4.5V$		7		nC
Gate-Source Charge	Q_{gs}	$V_{DS}=-15V, I_D=-20A$		1.3		nC
Gate-Drain Charge	Q_{gd}	$V_{GS}=-10V$		5		nC

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ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS^b						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}, I_S = 10\text{A}$	N-Ch	0.9	1.3	V
		$V_{GS} = 0\text{V}, I_S = -6\text{A}$	P-Ch	-0.9	-1.3	

Notes

- a. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

N-Channel

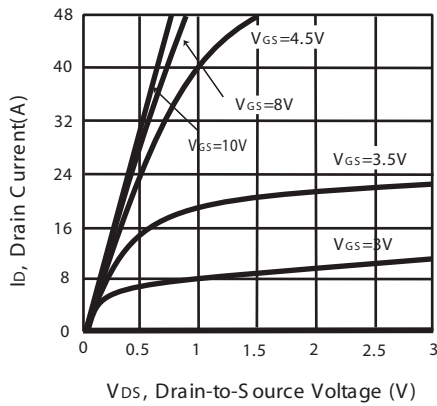


Figure 1. Output Characteristics

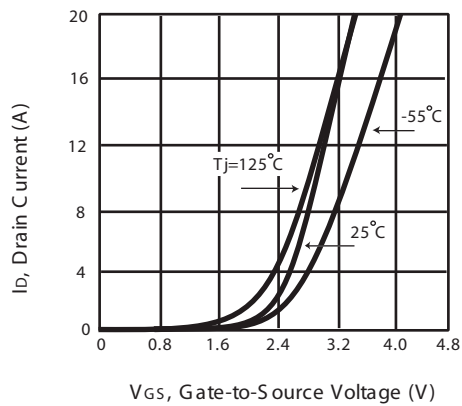


Figure 2. Transfer Characteristics

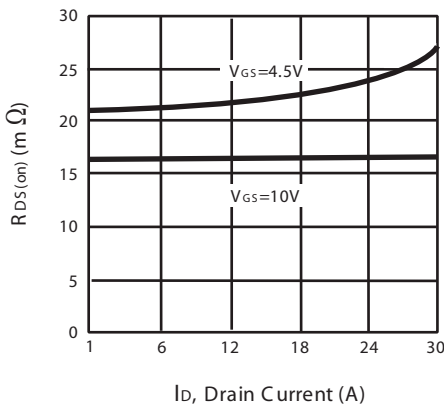


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

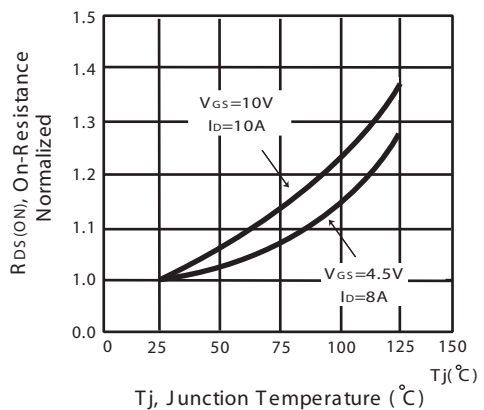


Figure 4. On-Resistance Variation with Drain Current and Temperature

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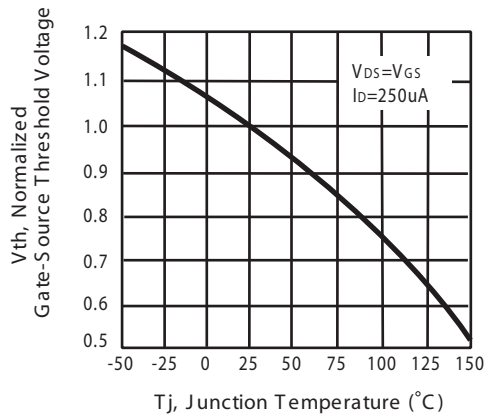


Figure 5. Gate Threshold Variation with Temperature

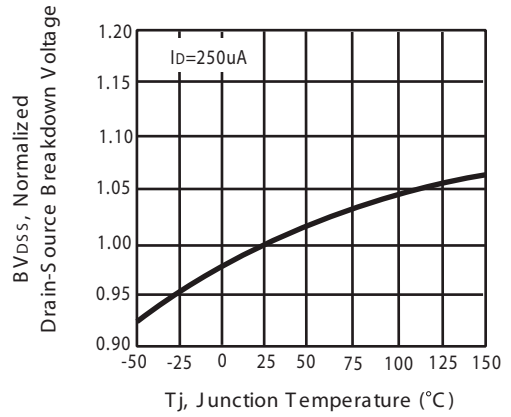


Figure 6. Breakdown Voltage Variation with Temperature

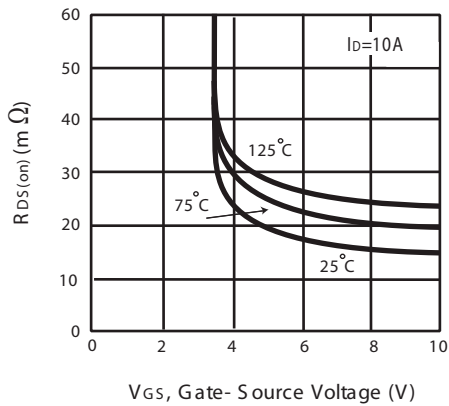


Figure 7. On-Resistance vs. Gate-Source Voltage

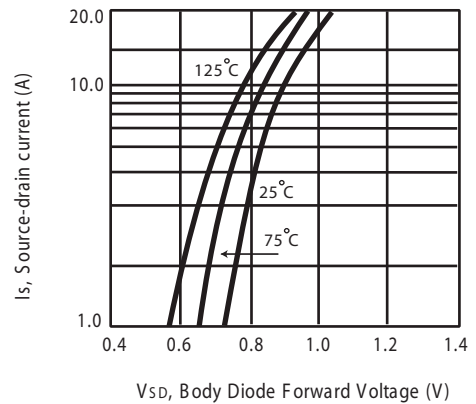
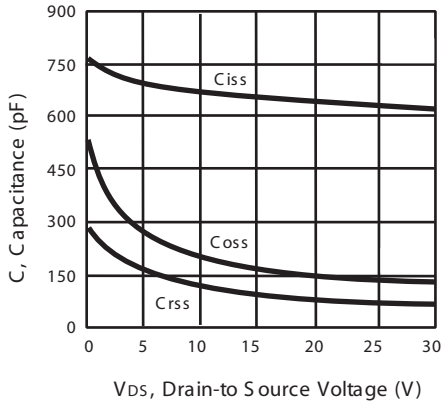


Figure 8. Body Diode Forward Voltage Variation with Source Current

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V_{DS} , Drain-to Source Voltage (V)

Figure 10. Capacitance

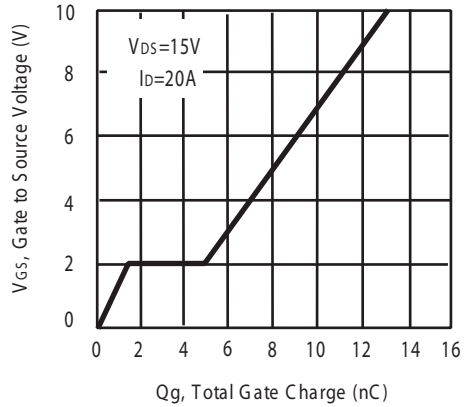


Figure 11. Gate Charge

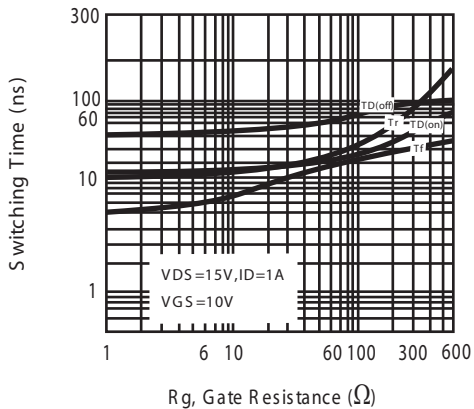


Figure 12. switching characteristics

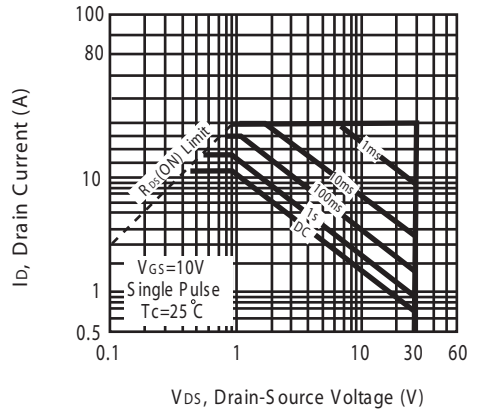


Figure 13. Maximum Safe Operating Area

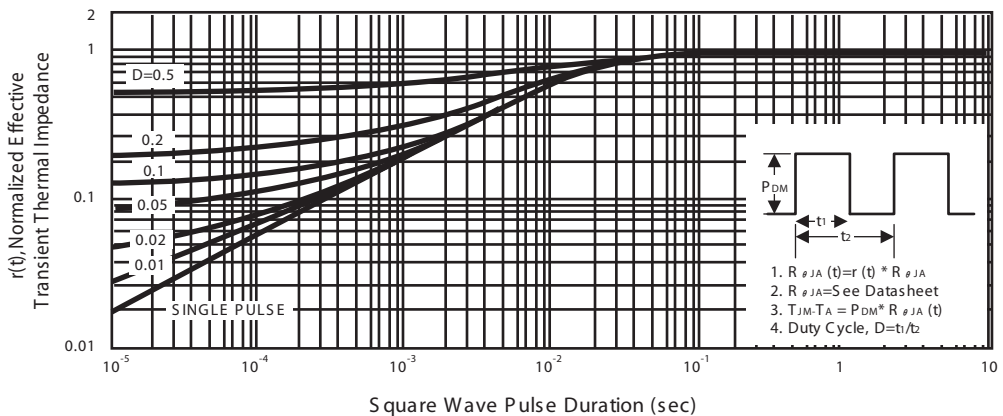


Figure 14. Normalized Thermal Transient Impedance Curve

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P-Channel

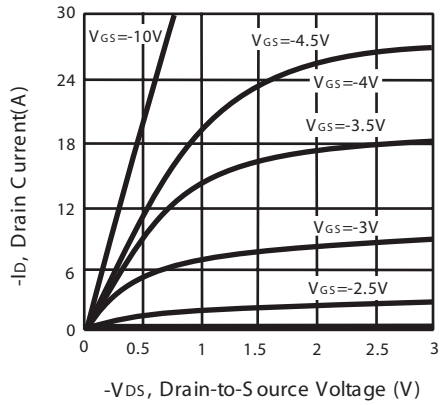


Figure 1. Output Characteristics

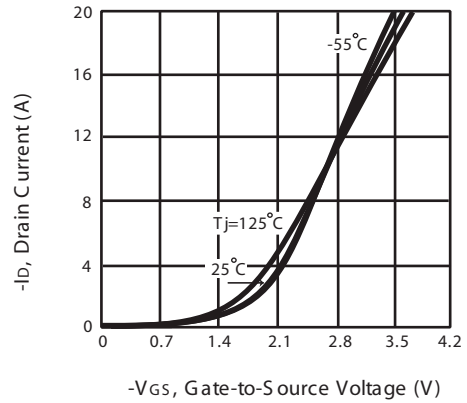


Figure 2. Transfer Characteristics

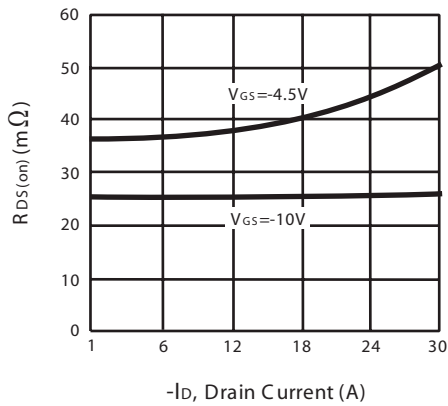


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

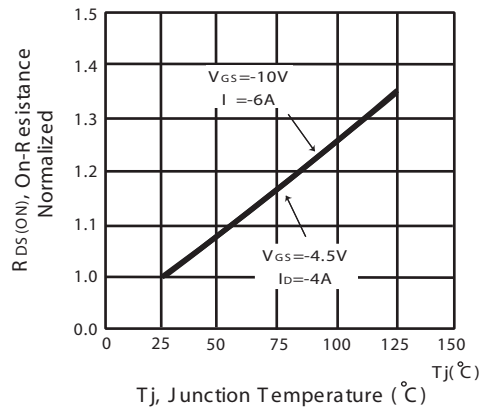


Figure 4. On-Resistance Variation with Drain Current and Temperature

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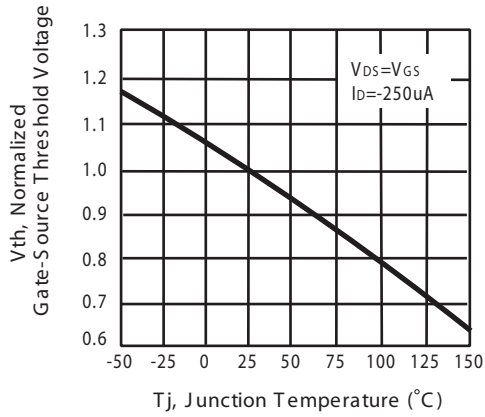


Figure 5. Gate Threshold Variation with Temperature

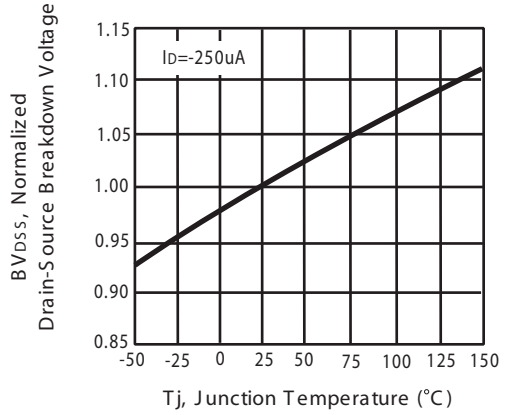


Figure 6. Breakdown Voltage Variation with Temperature

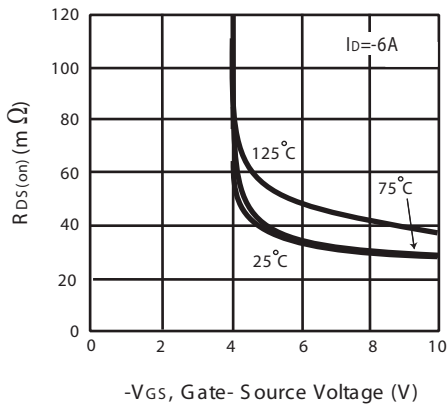


Figure 7. On-Resistance vs. Gate-Source Voltage

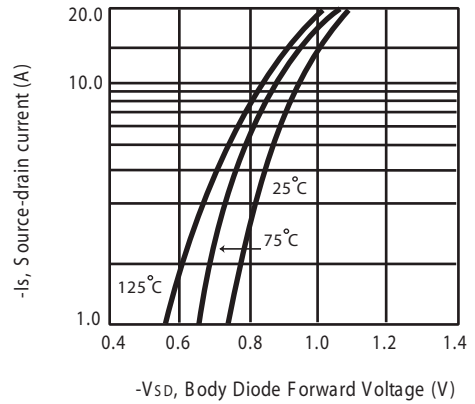


Figure 8. Body Diode Forward Voltage Variation with Source Current

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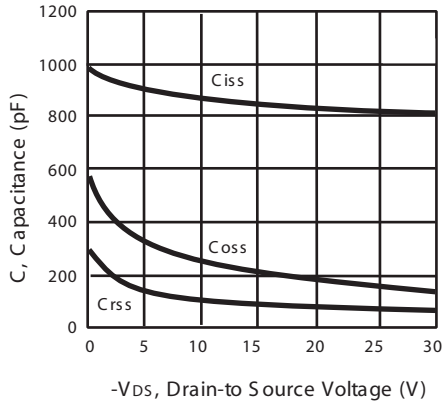


Figure 10. Capacitance

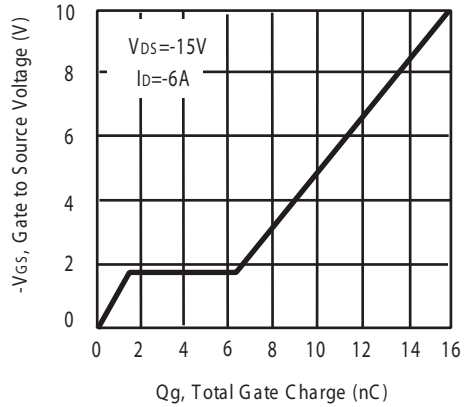


Figure 11. Gate Charge

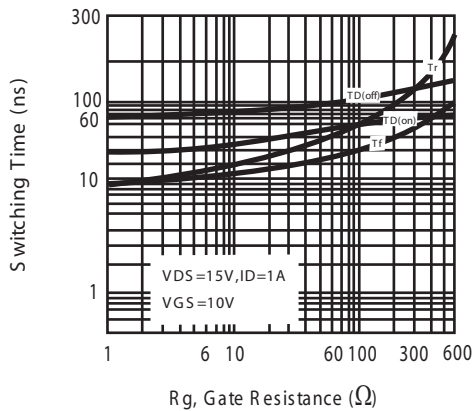


Figure 12. switching characteristics

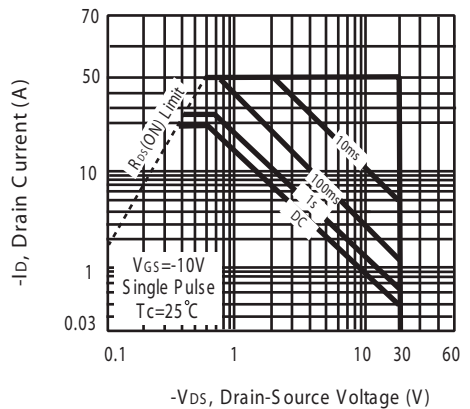


Figure 13. Maximum Safe Operating Area

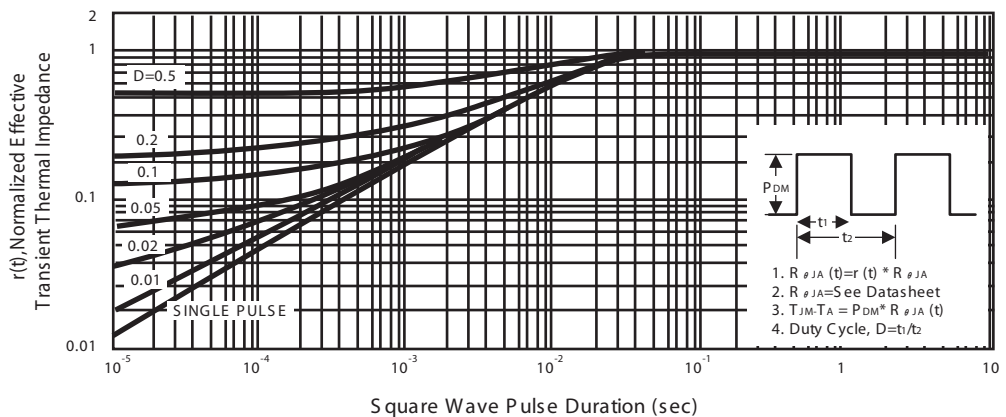
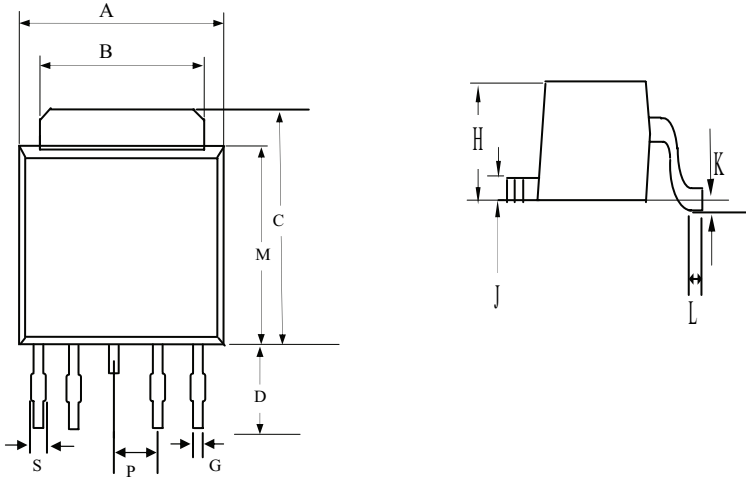


Figure 14. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

TO-252-4L

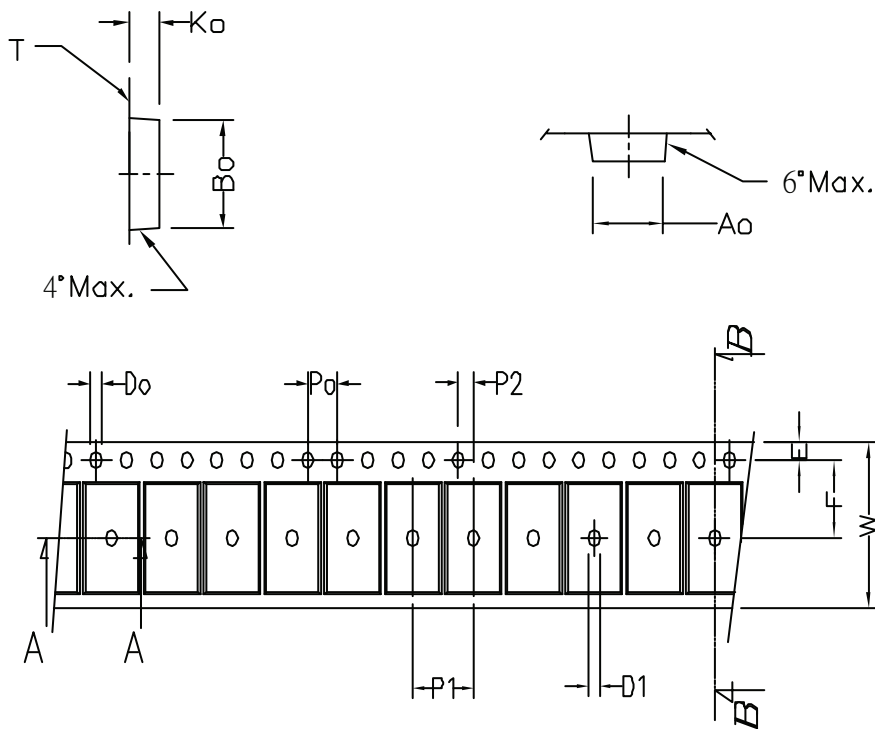


REF .	Millimeters	
	MIN	MAX
A	6.40	6.80
B	5.2	5.50
C	6.80	10.20
D	2.20	3.00
P	1.27 REF.	
S	0.50	0.80
G	0.40	0.60
H	2.20	2.40
J	0.45	0.60
K	0	0.15
L	0.90	1.50
M	5.40	5.80

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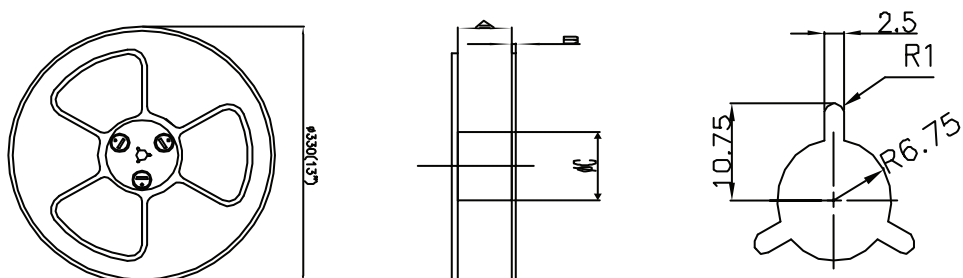
TO-252-4L Tape and Reel Data

TO-252-4L Carrier Tape



symbol	A_0	B_0	K_0	P_0	P_1	P_2	T
Spec	6.96 ± 0.1	10.49 ± 0.1	2.79 ± 0.1	4.0 ± 0.1	8.0 ± 0.10	2.0 ± 0.05	0.33 ± 0.013
symbol	E	F	D_0	D_1	W	$10P_0$	
Spec	1.75 ± 0.1	7.5 ± 0.05	1.55 ± 0.05	1.5 ± 0.25	$16.0^{+0.3}_{-0.1}$	40.0 ± 0.2	

TO-252-4L Reel



UNIT:mm

Width of carrier tape	8	12	16	24	32	44	56
$A \pm 0.1$	9.4	13.4	17.4	25.4	33.4	45.4	57.4
B	2.3	2.3	2.3	2.3	2.3	2.3	2.3
ϕC	100	100	100	100	100	100	100