



STU405D

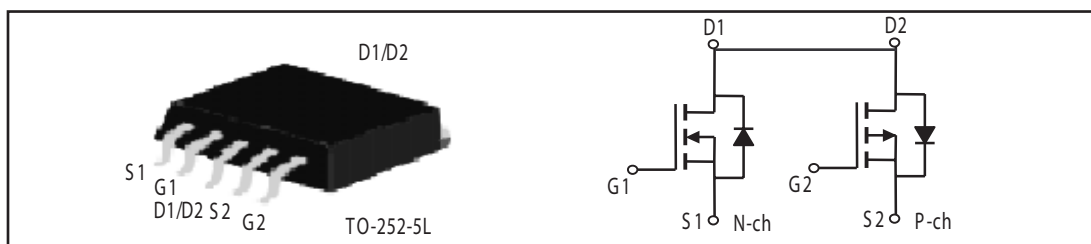
Dual Enhancement Mode Field Effect Transistor (N and P Channel)

PRODUCT SUMMARY (N-Channel)

V _{DSS}	I _D	R _{DS(ON)} (m Ω) Max
40V	16A	30 @ V _{GS} = 10V
		40 @ V _{GS} = 4.5V

PRODUCT SUMMARY (P-Channel)

V _{DSS}	I _D	R _{DS(ON)} (m Ω) Max
-40V	-12A	48 @ V _{GS} = -10V
		65 @ 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}	40	-40	V
Gate-Source Voltage		V _{GS}	±20	± 20	V
Drain Current-Continuous @ T _c	25°C	I _D	16	-12	A
	70°C		13.8	-10	A
-Pulsed ^a		I _{DM}	50	-50	A
Drain-Source Diode Forward Current		I _S	8	-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 (TA = 25 °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 = 250uA	40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 32V, V _{GS} = 0V			1	uA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS ^a						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	1	1.8	3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 8A		22	30	m ohm
		V _{GS} = 4.5V, I _D = 6A		30	40	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 = 8A		20		S
DYNAMIC CHARACTERISTICS ^b						
Input Capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz		885	1050	pF
Output Capacitance	C _{oss}			105		pF
Reverse Transfer Capacitance	C _{rss}			65		pF
Gate resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1.0MHz		0.32		ohm
SWITCHING CHARACTERISTICS ^b						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 20V I _D = 1 A V _{GS} = 10V R _{GEN} = 3.3 ohm		16		ns
Rise Time	t _r			12		ns
Turn-Off Delay Time	t _{D(OFF)}			28		ns
Fall Time	t _f			7		ns
Total Gate Charge	Q _g	V _{DS} = 28V, I _D = 8A, V _{GS} = 10V		17		nC
		V _{DS} = 28V, I _D = 8A, V _{GS} = 4.5V		8.6		nC
Gate-Source Charge	Q _{gs}	V _{DS} = 28V, I _D = 8 A V _{GS} = 10V		2.2		nC
Gate-Drain Charge	Q _{gd}			4.8		nC

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P-Channel ELECTRICAL CHARACTERISTICS (TA = 25 °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 = -250uA	-40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -32V, V _{GS} = 0V			-1	uA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS ^a						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250uA	-1	-1.6	-3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = -10V, I _D = -6A		40	48	m ohm
		V _{GS} = -4.5V, I _D = -4A		50	65	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		12		S
DYNAMIC CHARACTERISTICS ^b						
Input Capacitance	C _{ISS}	V _{DS} = -25V, V _{GS} = 0V f = 1.0MHz		980	1150	pF
Output Capacitance	C _{OSS}			135		pF
Reverse Transfer Capacitance	C _{RSS}			90		pF
Gate resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1.0MHz		2.2		ohm
SWITCHING CHARACTERISTICS ^b						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = -20V I _D = -1A V _{GS} = -10V R _{GEN} = 3.3 ohm		12		ns
Rise Time	t _r			17		ns
Turn-Off Delay Time	t _{D(OFF)}			82		ns
Fall Time	t _f			35		ns
Total Gate Charge	Q _g	V _{DS} = -28V, I _D = -6A, V _{GS} = -10V		20.7		nC
		V _{DS} = -28V, I _D = -6A, V _{GS} = -4.5V		11		nC
Gate-Source Charge	Q _{gs}	V _{DS} = -28V, I _D = -6 A V _{GS} = -10V		1.5		nC
Gate-Drain Charge	Q _{gd}			6.2		nC

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ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS ^b						
Diode Forward Voltage	V _{SD}	V _{GS} = 0V, I _S = 8A	N-Ch	0.98	1.2	V
		V _{GS} = 0V, I _S = -6A	P-Ch	-0.9	-1.2	

Notes

- a.Pulse Test:Pulse Width ≤300 μs, Duty Cycle ≤2%.
- b.Guaranteed by design, not subject to production testing.

N-Channel

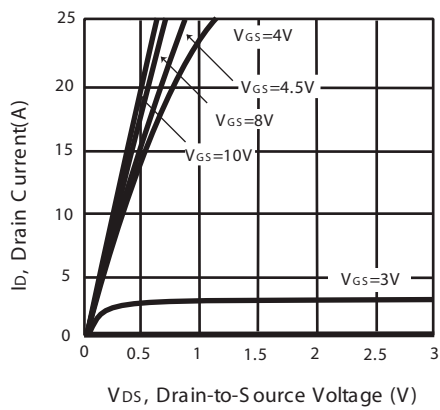


Figure 1. Output Characteristics

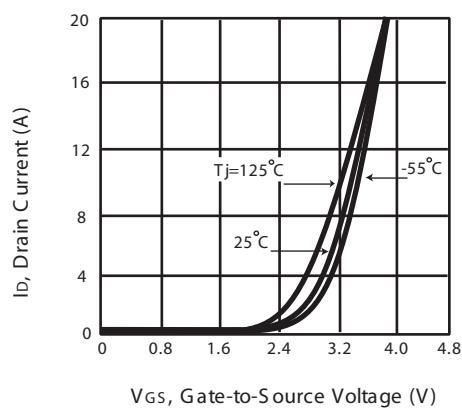


Figure 2. Transfer Characteristics

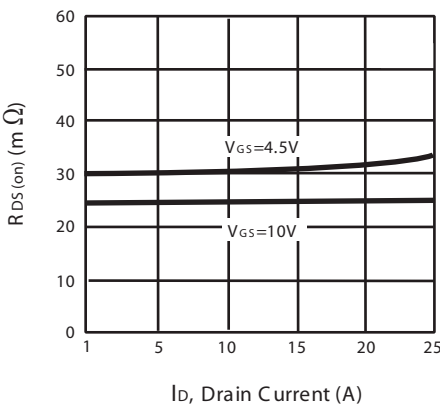


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

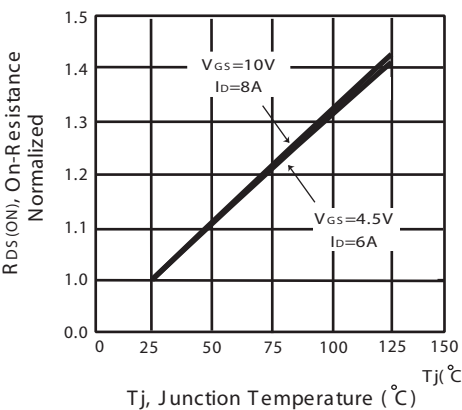


Figure 4. On-Resistance Variation with Drain Current and Temperature

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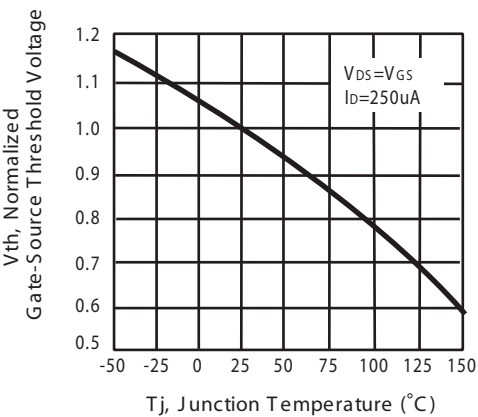


Figure 5. Gate Threshold Variation with Temperature

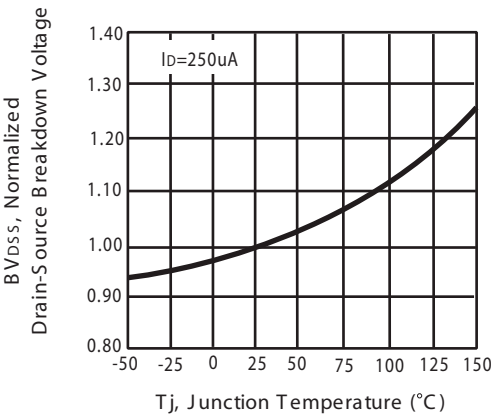


Figure 6. Breakdown Voltage Variation with Temperature

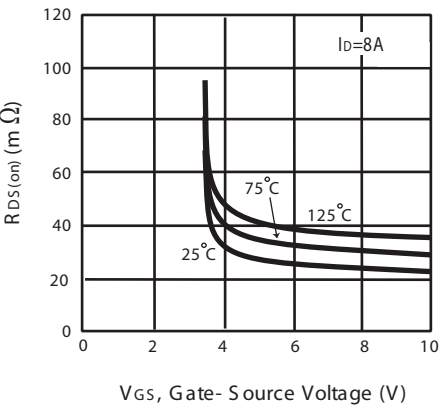


Figure 7. On-Resistance vs. Gate-Source Voltage

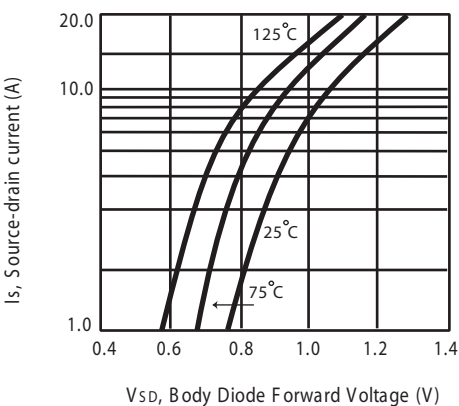


Figure 8. Body Diode Forward Voltage Variation with Source Current

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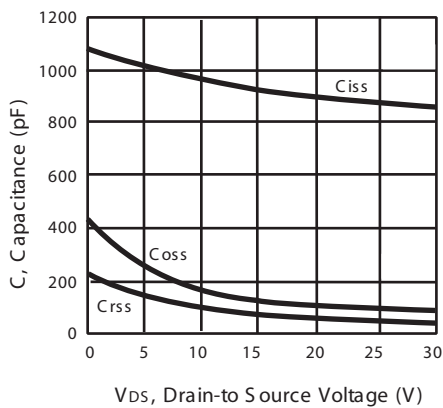


Figure 9. Capacitance

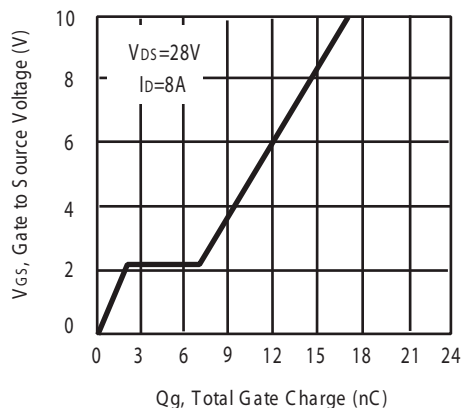


Figure 10. Gate Charge

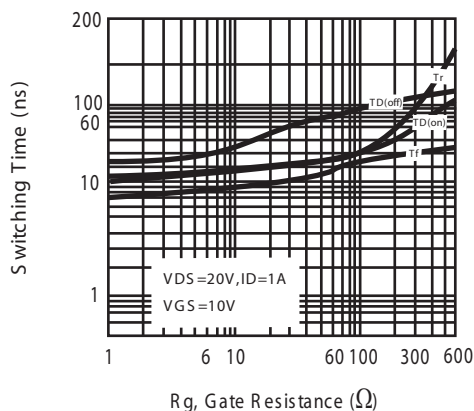


Figure 11. switching characteristics

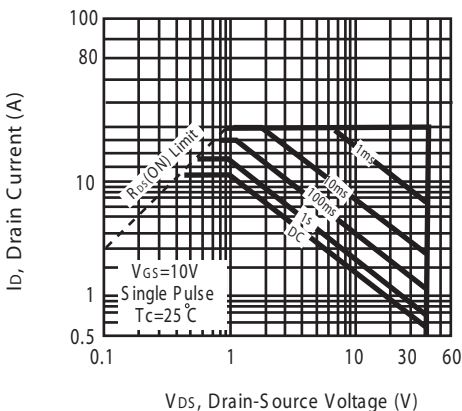


Figure 12. Maximum Safe Operating Area

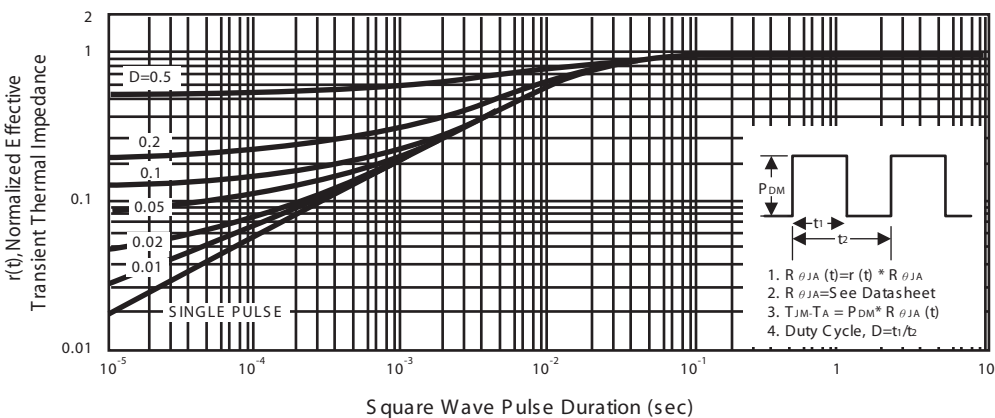


Figure 13. Normalized Thermal Transient Impedance Curve

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P-Channel

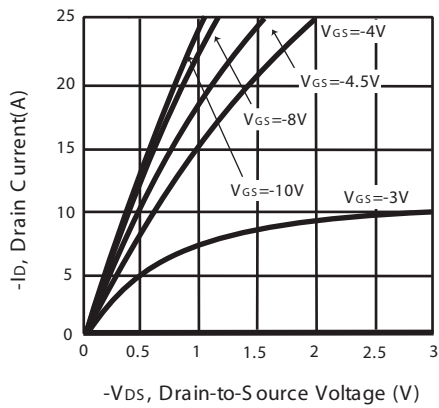


Figure 1. Output Characteristics

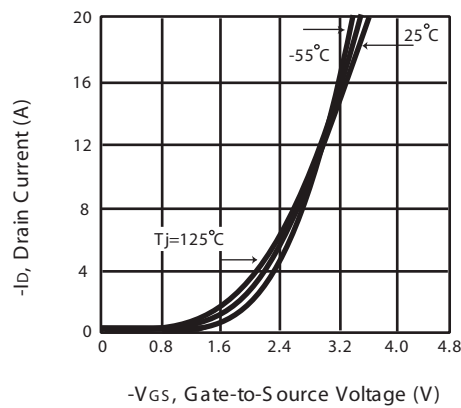


Figure 2. Transfer Characteristics

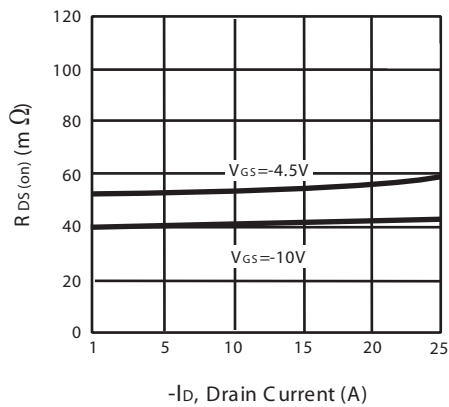


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

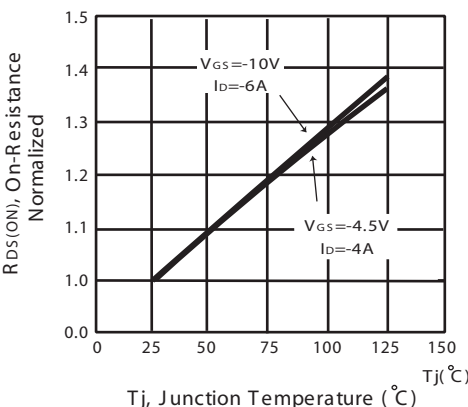


Figure 4. On-Resistance Variation with Drain Current and Temperature

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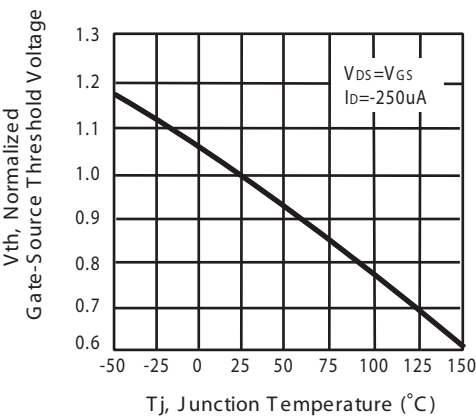


Figure 5. Gate Threshold Variation with Temperature

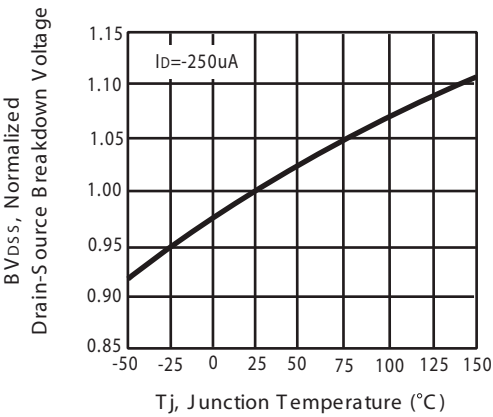


Figure 6. Breakdown Voltage Variation with Temperature

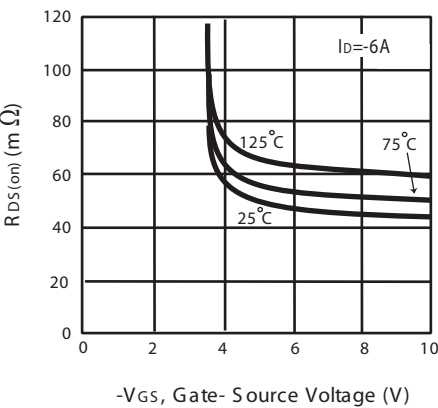


Figure 7. On-Resistance vs. Gate-Source Voltage

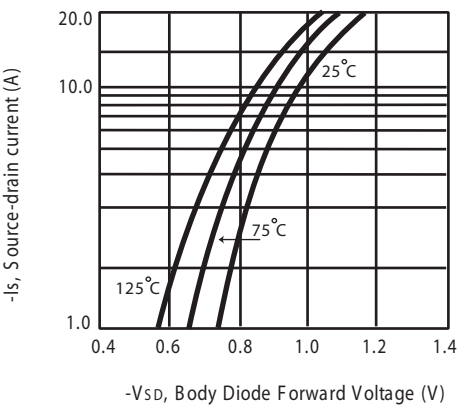


Figure 8. Body Diode Forward Voltage Variation with Source Current

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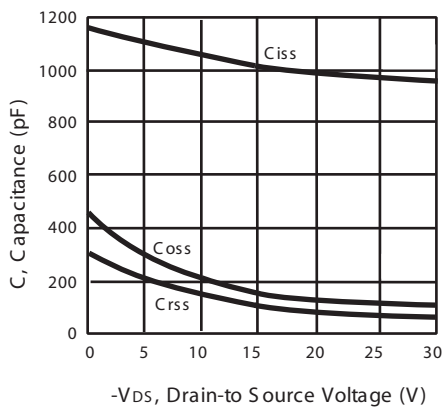


Figure 9. Capacitance

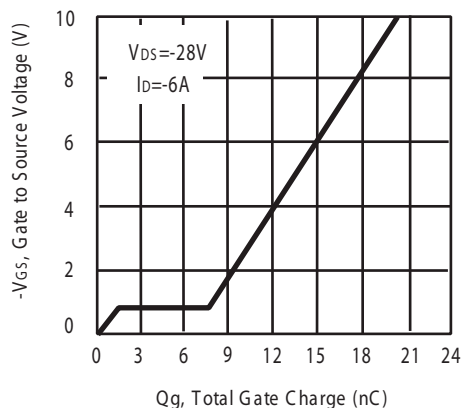


Figure 10. Gate Charge

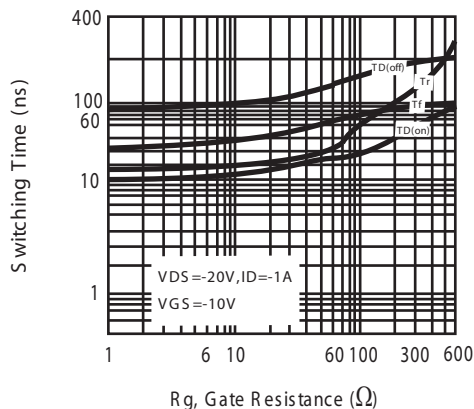


Figure 11. switching characteristics

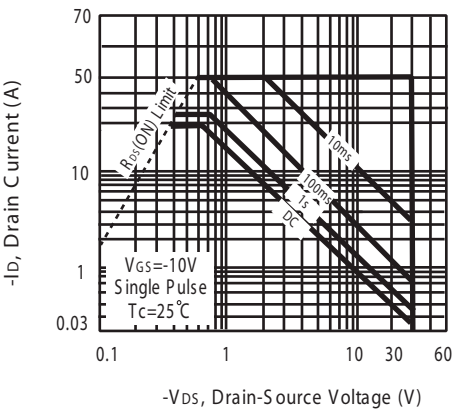


Figure 12. Maximum Safe Operating Area

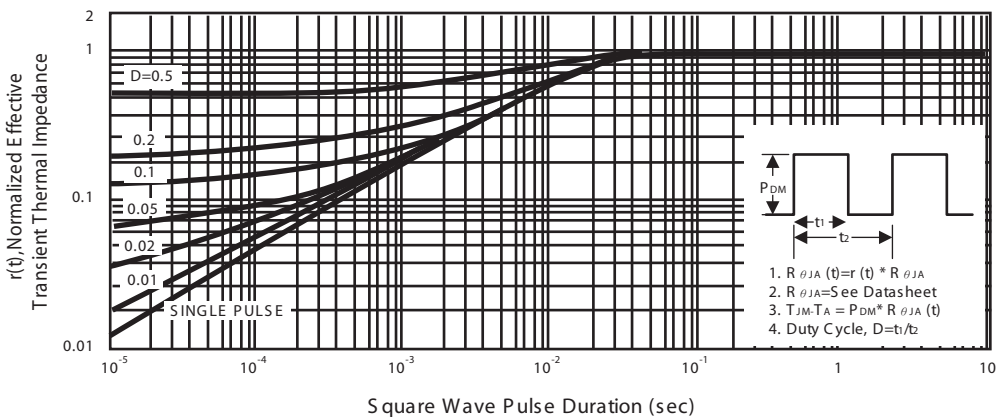
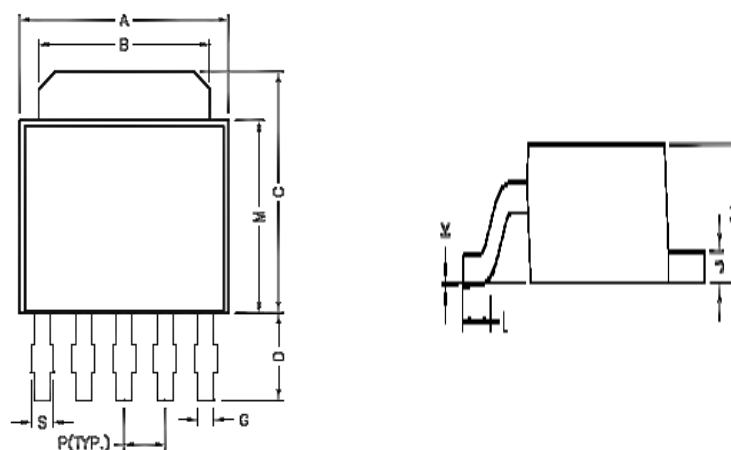


Figure 13. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

TO-252-5L

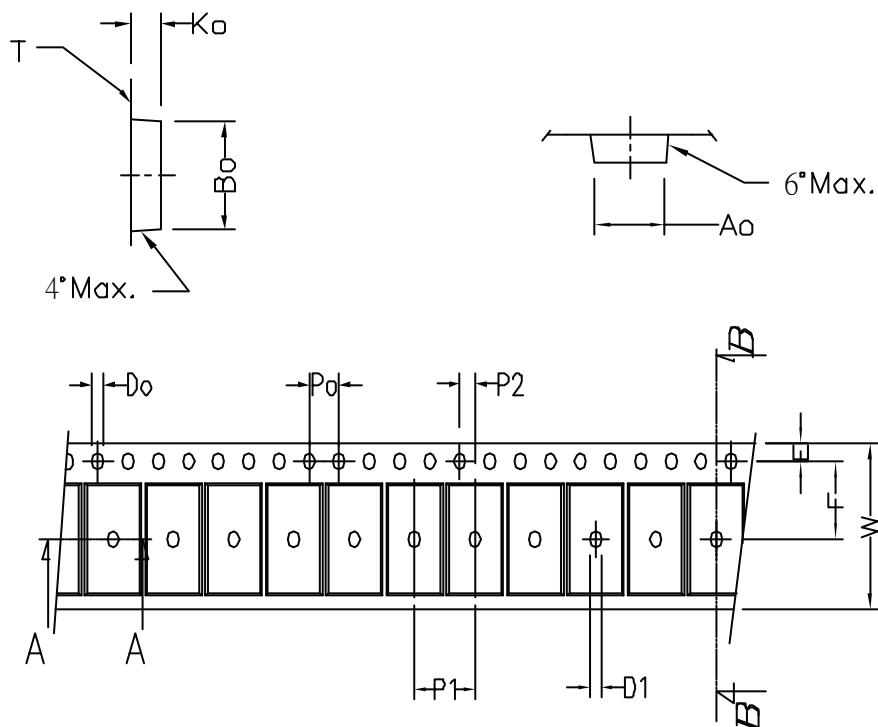


REF .	Millimeters		REF .	Millimeters	
	MIN	MAX		MIN	MAX
A	6.40	6.80	G	0.40	0.60
B	5.20	5.50	H	2.2	2.40
C	6.80	7.20	J	0.45	0.55
D	2.20	2.80	K	0	0.15
P	1.27 REF.		L	0.90	1.50
S	0.50	0.80	M	5.40	5.80

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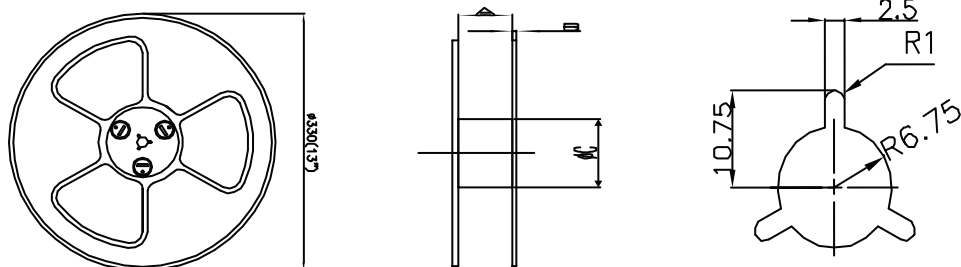
TO-252-5L Tape and Reel Data

TO-252-5L 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	40.0 ± 0.2	

TO-252-5L 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