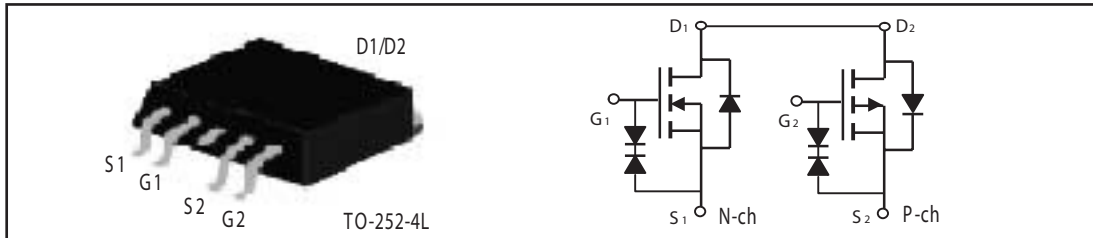




Dual Enhancement Mode Field Effect Transistor (N and P Channel)

PRODUCT SUMMARY (N-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
30V	18A	23 @ V _{GS} = 10V
		35 @ V _{GS} = 4.5V

PRODUCT SUMMARY (P-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
-30V	-14A	35 @ V _{GS} = -10V
		55 @ 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}	±20	±20	V
Drain Current-Continuous @ T _c	I _D	18	-14	A
		15	-12	A
-Pulsed ^a	I _{DM}	50	-50	A
Drain-Source Diode Forward Current	I _S	10	-6	A
Maximum Power Dissipation	P _D	11		W
		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

STU309D

N-Channel ELECTRICAL CHARACTERISTICS (T_A = 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	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 24V, V _{GS} = 0V			1	uA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±10	uA
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 = 10A		17	23	m ohm
		V _{GS} = 4.5V, I _D = 8A		23	35	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 = 1 A V _{GS} = 10V R _{GEN} = 6 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 = 20 A		1.5		nC
Gate-Drain Charge	Q _{gd}	V _{GS} = 10V		3.5		nC

STU309D

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	-30			V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -24V, V _{GS} = 0V			-1	uA	
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±10	uA	
ON CHARACTERISTICS^a							
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250uA	-1	-1.9	-3	V	
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = -10V, I _D = -6A		28	35	m ohm	
		V _{GS} = -4.5V, I _D = -4A		44	55	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		850		pF	
Output Capacitance	C _{OSS}			220		pF	
Reverse Transfer Capacitance	C _{RSS}			130		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 ohm		12		ns	
Rise Time	t _r			15		ns	
Turn-Off Delay Time	t _{D(OFF)}				75		ns
Fall Time	t _f				35		ns
Total Gate Charge	Q _g	V _{DS} = -15V, I _D = -20A, V _{GS} = -10V		16		nC	
		V _{DS} = -15V, I _D = -20A, V _{GS} = -4.5V		8		nC	
Gate-Source Charge	Q _{gs}	V _{DS} = -15V, I _D = -20 A		1.6		nC	
Gate-Drain Charge	Q _{gd}	V _{GS} = -10V		4.7		nC	

STU309D

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}	$V_{GS} = 0V, I_s = 10A$	N-Ch	0.9	1.3	V
		$V_{GS} = 0V, I_s = -6A$	P-Ch	-0.9	-1.3	

Notes

a. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

N-Channel

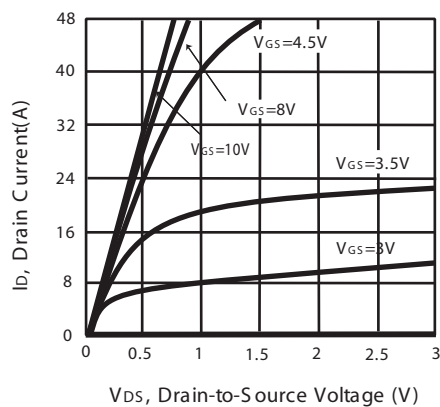


Figure 1. Output Characteristics

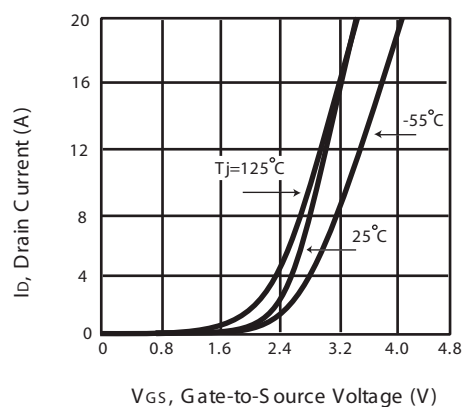


Figure 2. Transfer Characteristics

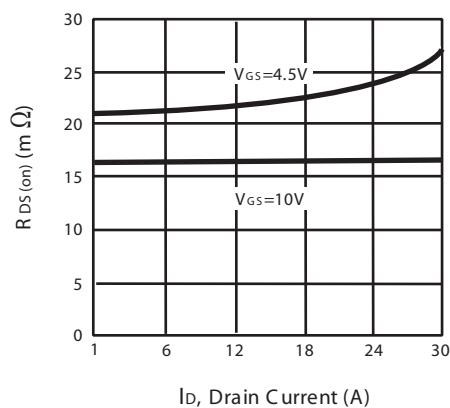


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

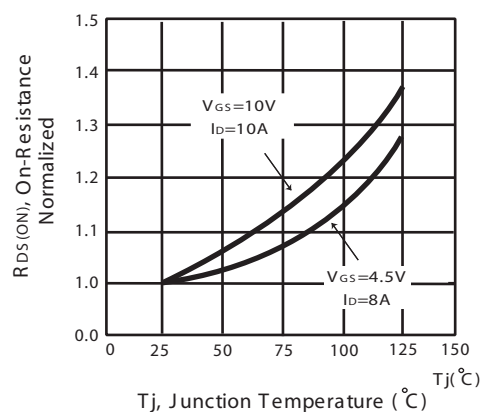


Figure 4. On-Resistance Variation with Drain Current and Temperature

STU309D

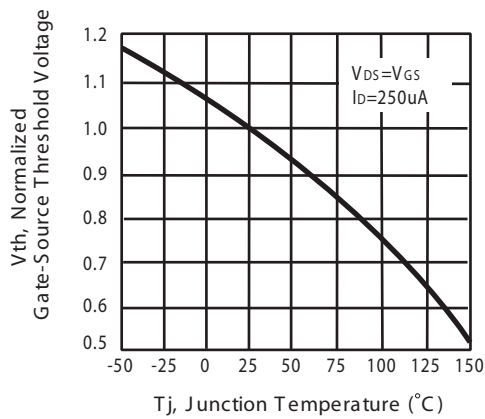


Figure 5. Gate Threshold Variation with Temperature

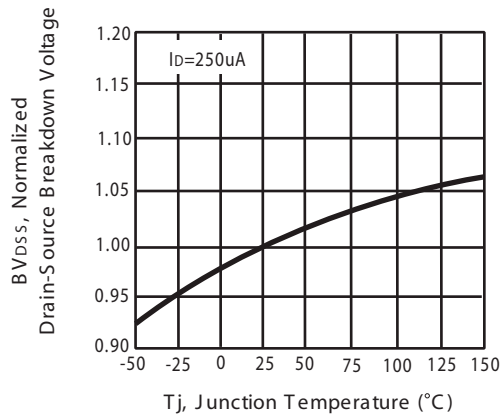


Figure 6. Breakdown Voltage Variation with Temperature

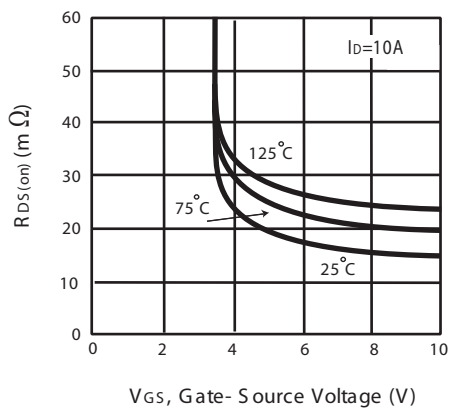


Figure 7. On-Resistance vs. Gate-Source Voltage

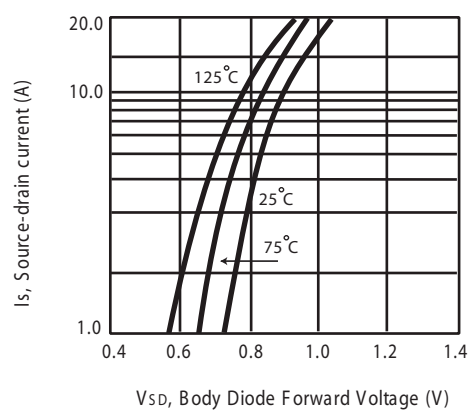


Figure 8. Body Diode Forward Voltage Variation with Source Current

STU309D

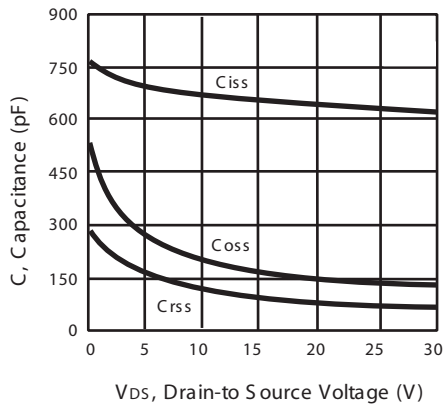


Figure 10. Capacitance

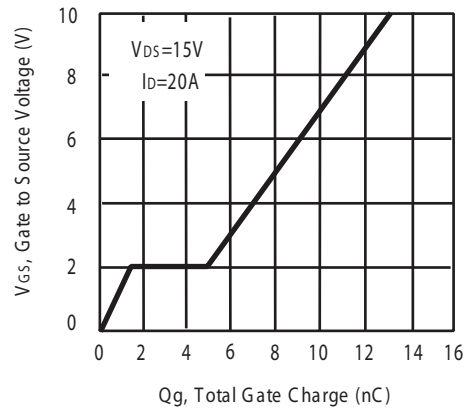


Figure 11. Gate Charge

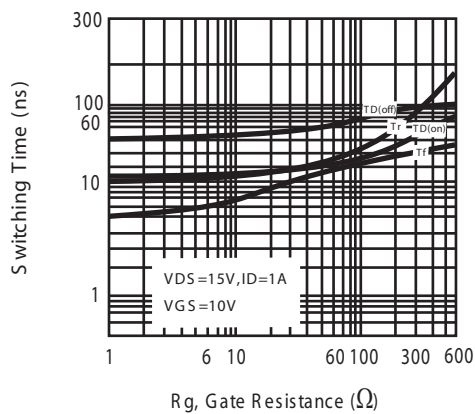


Figure 12. switching characteristics

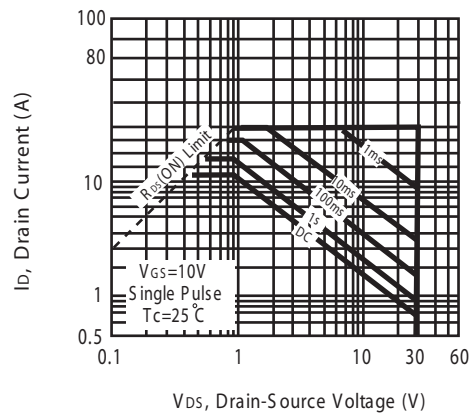


Figure 13. Maximum Safe Operating Area

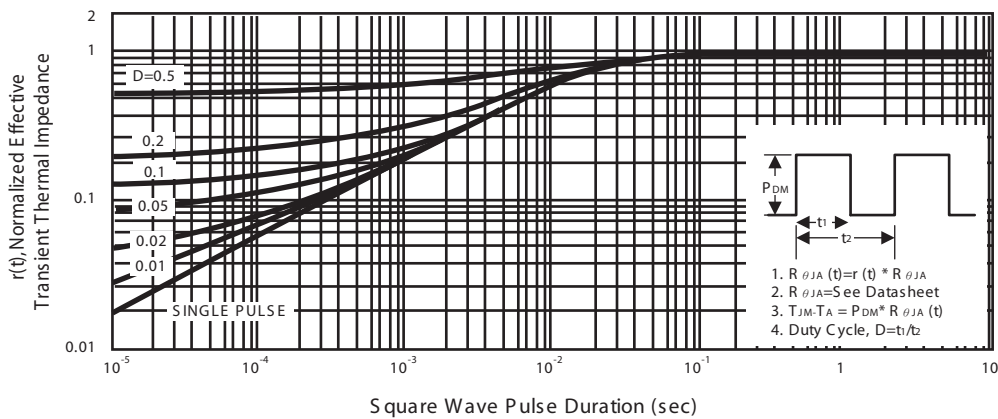


Figure 14. Normalized Thermal Transient Impedance Curve

STU309D

P-Channel

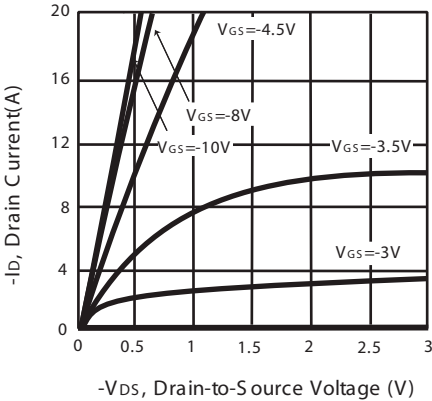


Figure 1. Output Characteristics

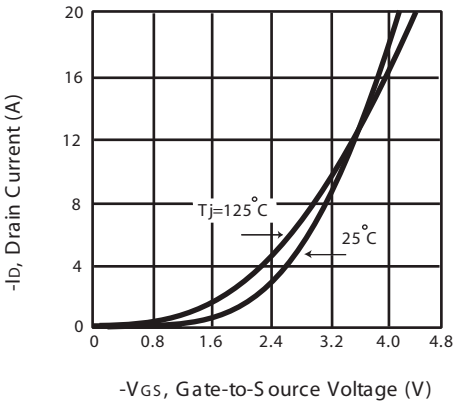


Figure 2. Transfer Characteristics

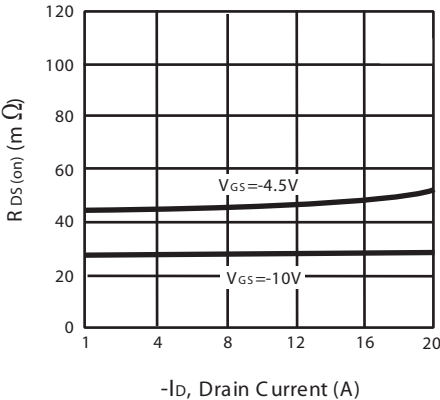


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

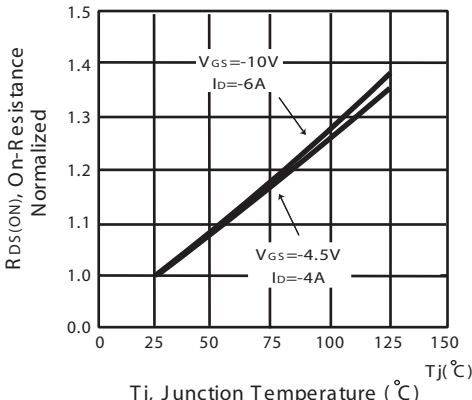


Figure 4. On-Resistance Variation with Drain Current and Temperature

STU309D

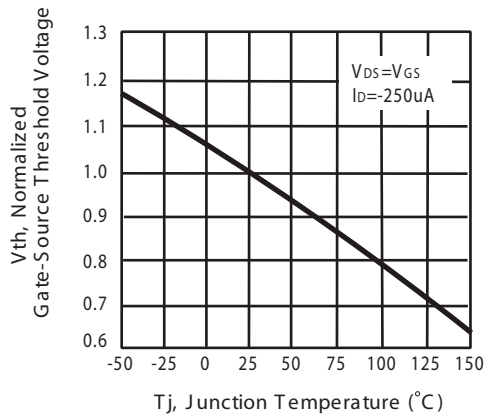


Figure 5. Gate Threshold Variation with Temperature

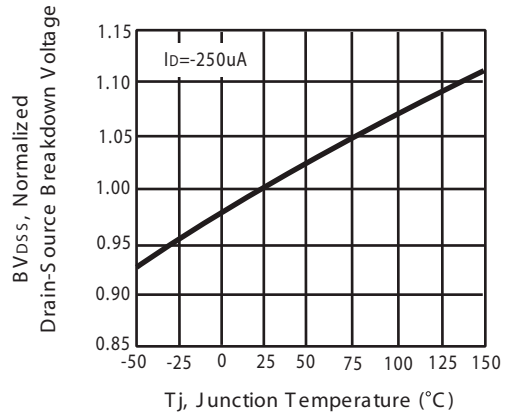


Figure 6. Breakdown Voltage Variation with Temperature

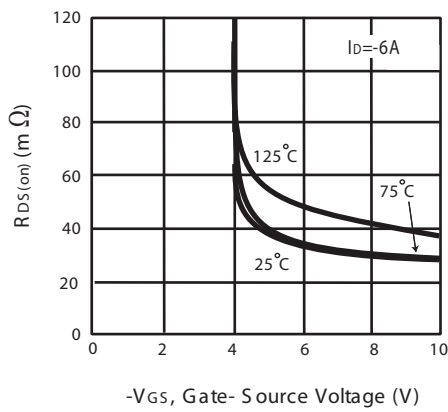


Figure 7. On-Resistance vs. Gate-Source Voltage

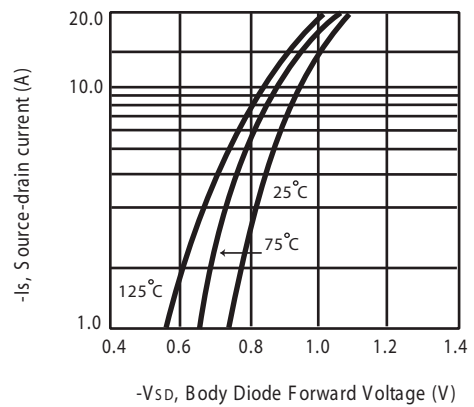


Figure 8. Body Diode Forward Voltage Variation with Source Current

STU309D

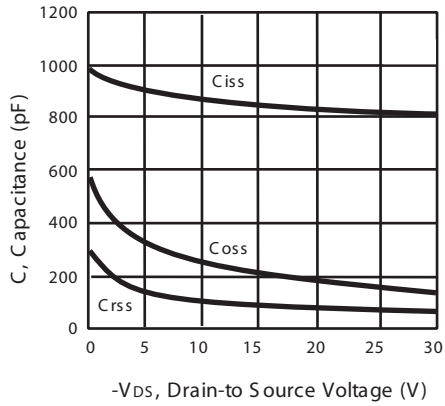


Figure 10. Capacitance

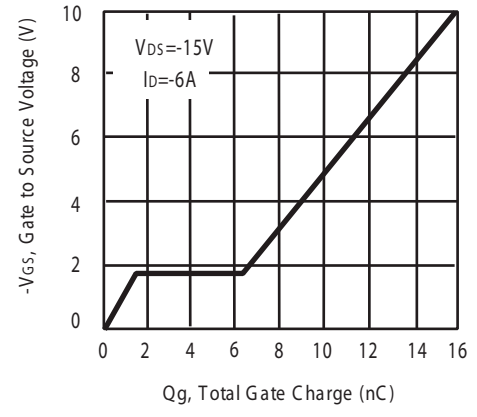


Figure 11. Gate Charge

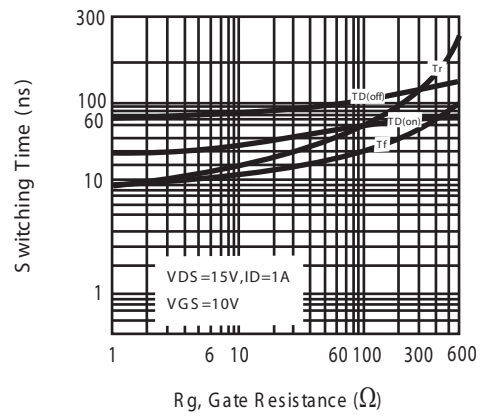


Figure 12. switching characteristics

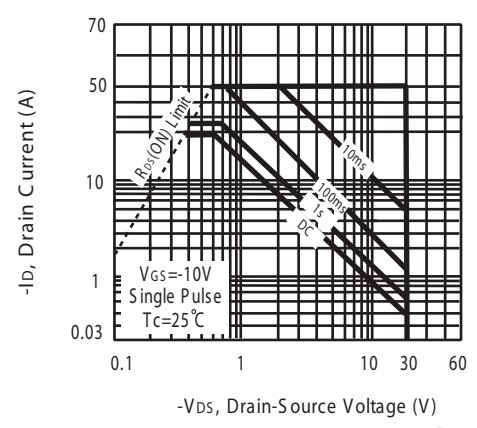


Figure 13. Maximum Safe Operating Area

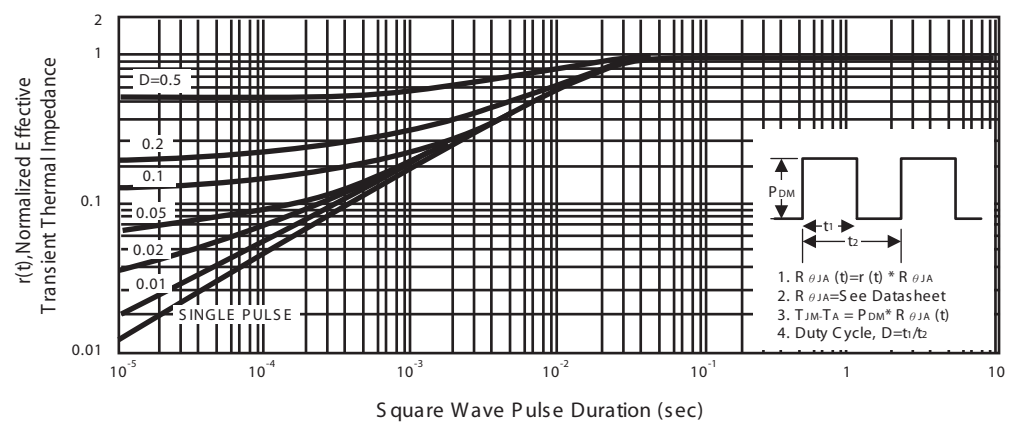
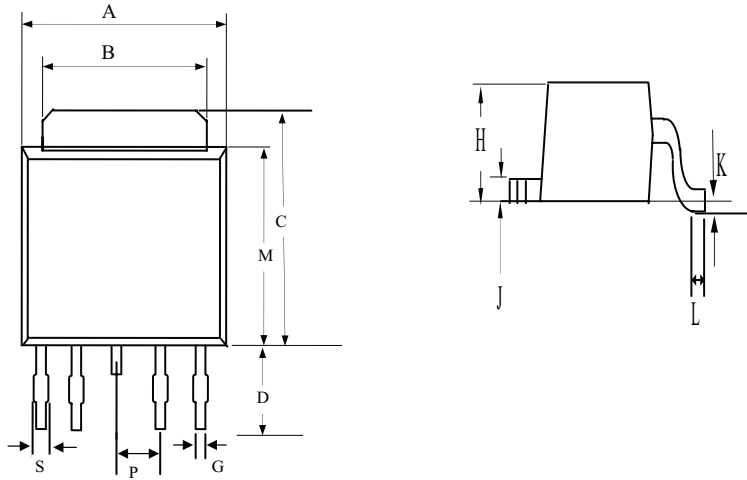


Figure 14. Normalized Thermal Transient Impedance Curve

STU309D

PACKAGE OUTLINE DIMENSIONS

TO-252-4L

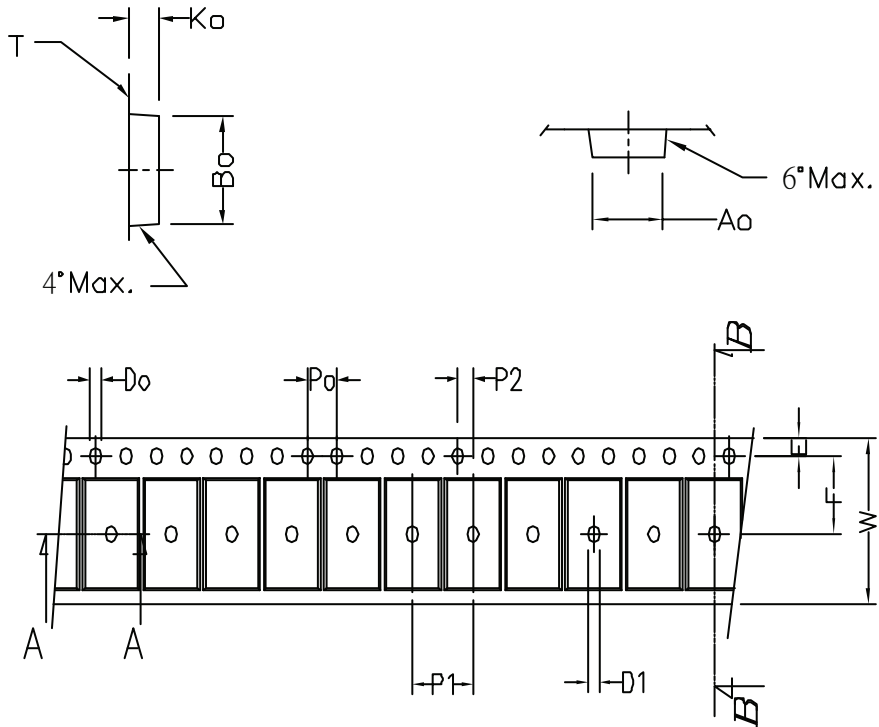


REF .	Millimeters	
	MIN	MAX
A	6.40	6.80
B	5.2	5.50
C	6.80	10.20
D	2.20	3.00
P	1.27 REF.	
S	0.50	0.80
G	0.40	0.60
H	2.20	2.40
J	0.45	0.60
K	0	0.15
L	0.90	1.50
M	5.40	5.80

STU309D

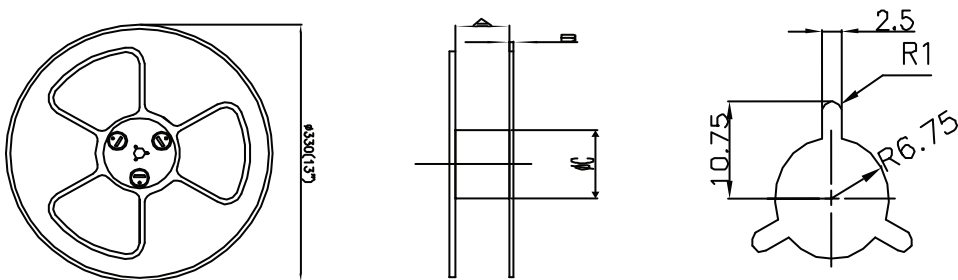
TO-252-4L Tape and Reel Data

TO-252-4L Carrier Tape



symbol	Ao	Bo	Ko	Po	P1	P2	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	Do	D1	W	10Po	
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±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
øC	100	100	100	100	100	100	100