

Description:

This N-Channel and P-Channel MOSFET use advanced trench technology

and design to provide excellent $R_{DS(on)}$ with low gate charge.

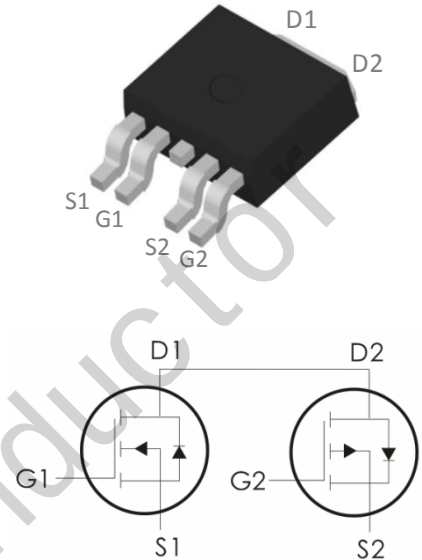
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=40V, I_D=60A, R_{DS(on)} < 5.5m\Omega @ V_{GS}=10V$

P-Channel: $V_{DS}=-40V, I_D=-38A, R_{DS(on)} < 15m\Omega @ V_{GS}=-10V$

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.



Absolute Maximum Ratings: ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current $T_C=25^\circ C$	60	-38	A
	Continuous Drain Current- $T_C=100^\circ C$	35	-20	
	Pulsed Drain Current ¹	250	-125	
P_D	Power Dissipation $T_C=25^\circ C$	55	55	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.3	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	

N-CH Electrical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-40V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1	1.6	2.5	V
R _{DS(ON)}	Drain-Source On Resistance ³	V _{GS} =10V, I _D =20A	---	4.2	5.5	m Ω
		V _{GS} =4.5V, I _D =10A	---	5.3	7	
G _{FS}	Forward Transconductance	V _{DS} =10V, I _D =10A	---	16	---	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	2380	3400	pF
C _{oss}	Output Capacitance		---	230	385	
C _{rss}	Reverse Transfer Capacitance		---	148	210	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time ^{2,3}	V _{DD} =20V, I _D =1A, R _{GEN} =3.3 Ω , V _{GS} =10V	---	14.2	28	ns
t _r	Rise Time ^{2,3}		---	18.3	36	ns
t _{d(off)}	Turn-Off Delay Time ^{2,3}		---	38.8	76	ns
t _f	Fall Time ^{2,3}		---	13.9	28	ns
Q _g	Total Gate Charge ³	V _{GS} =4.5V, V _{DS} =32V, I _D =10A	---	25	50	nC
Q _{gs}	Gate-Source Charge		---	6.5	13	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	12.1	24	nC
Drain-Source Diode Characteristics						
V _{SD}	Drain Diode Forward Voltage ³	V _{GS} =0V, I _S =1A	---	---	1	V
LS	Continuous Source Current	V _G =V _D =0V , Force Current	---	---	60	A
I _{sm}	Pulsed Source Current		---	---	250	A

Typical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

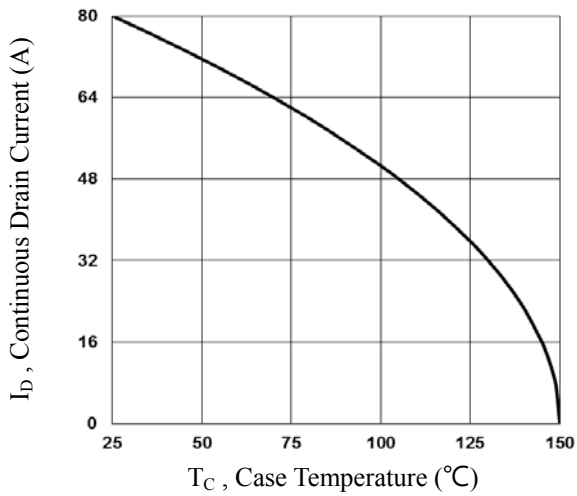


Fig.1 Continuous Drain Current vs. T_C

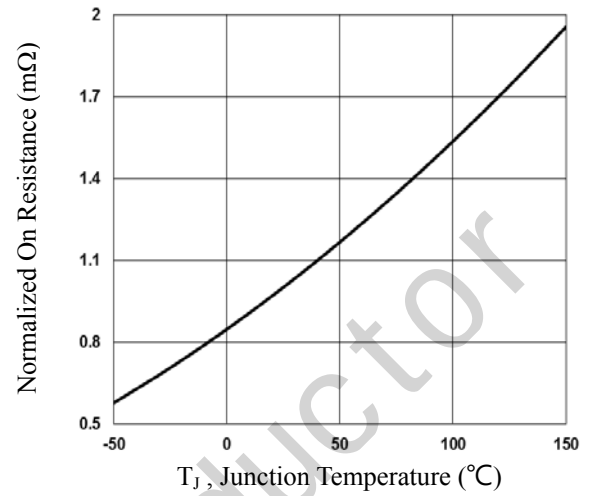


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

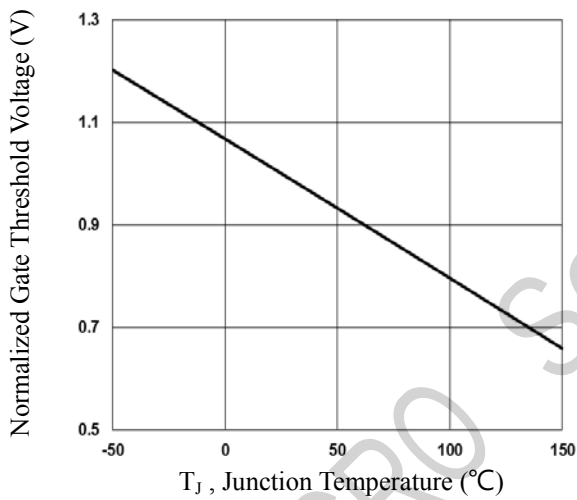


Fig.3 Normalized V_{th} vs. T_J

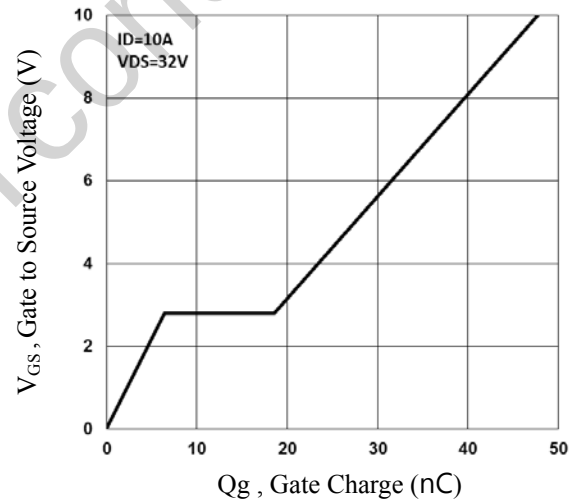


Fig.4 Gate Charge Waveform

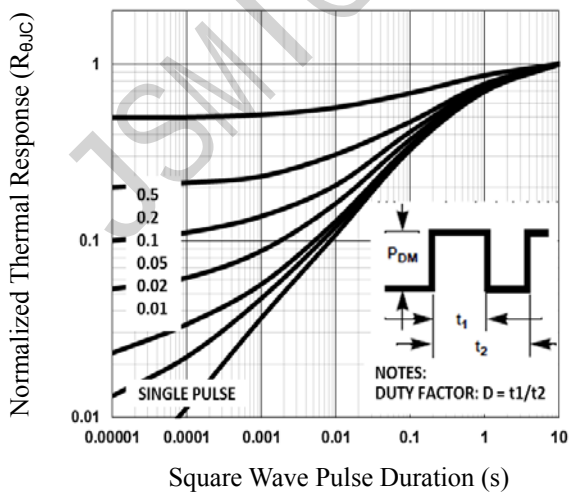


Fig.5 Normalized Transient Impedance

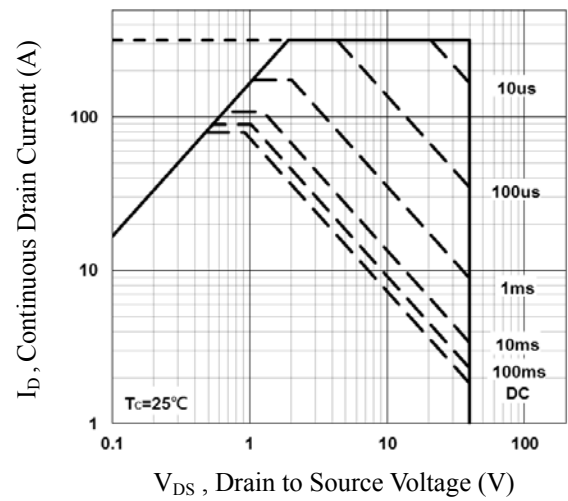


Fig.6 Maximum Safe Operation Area

Electrical Characteristics: ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D = -250 μ A	-40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} = -40V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D = -250 μ A	-1	---	-2.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = -10V, I _D = 210A	---	10.2	15	m Ω
		V _{GS} = -4.5V, I _D = -20A	---	13.5	17	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -20V, V _{GS} =0V, f=1MHz	---	3119	---	pF
C _{oss}	Output Capacitance		---	237	---	
C _{rss}	Reverse Transfer Capacitance		---	225	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -20V, I _D = -20A, V _{GS} = -10V, R _L =3 Ω	---	13	---	ns
t _r	Rise Time		---	15	---	ns
t _{d(off)}	Turn-Off Delay Time		---	35	---	ns
t _f	Fall Time		---	17	---	ns
Q _g	Total Gate Charge	V _{GS} = -10V, V _{DS} = -20V, I _D = -20A	---	41	---	nC
Q _{gs}	Gate-Source Charge		---	6	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	8.1	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Drain Diode Forward Voltage	V _{GS} =0V, I _S = -20A	---	---	-1.2	V
I _S	Continuous Source Curren	V _G =V _D =0V ,	---	---	-38	A
I _{SM}	Pulsed Source Current		---	---	-130	A
T _{rr}	Reverse recovery time,	IF =-20A dIF/dt=100A/μs	---	42	---	Ns
Q _{rr}	Reverse recovery charge		---	41	---	Nc

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-20V$, $V_G=-10V$, $R_G=25\Omega$, $L=0.5mH$.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

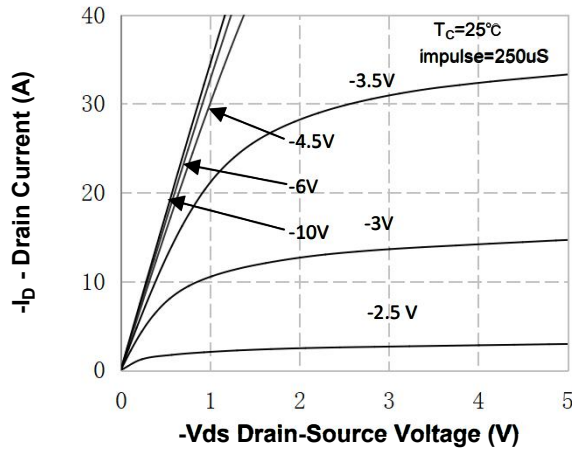


Figure 1. On-Region Characteristics

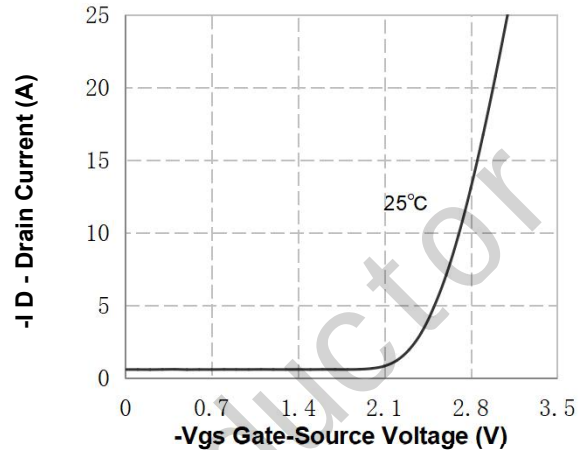


Figure 2. Transfer Characteristics

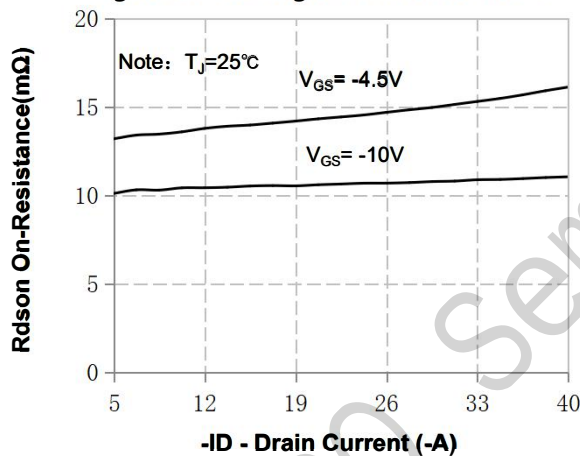


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

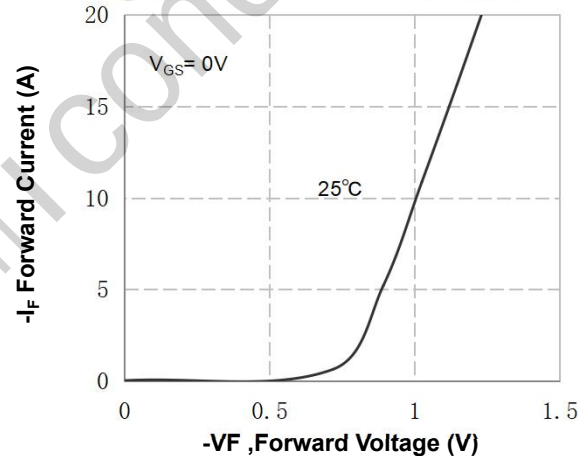


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

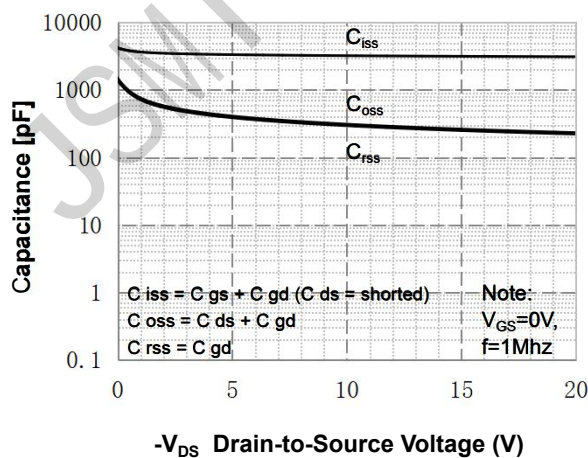


Figure 5. Capacitance Characteristics

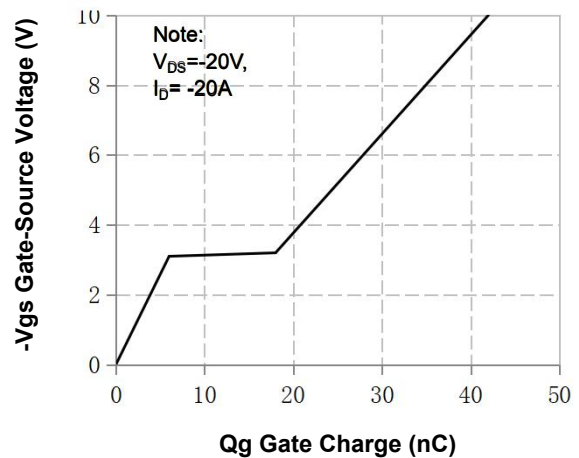


Figure 6. Gate Charge Characteristics

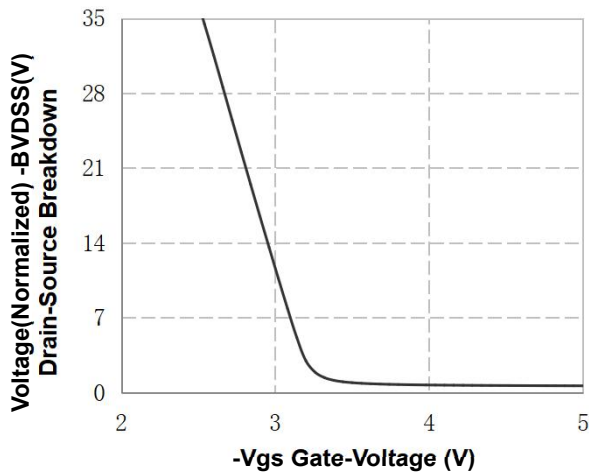


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

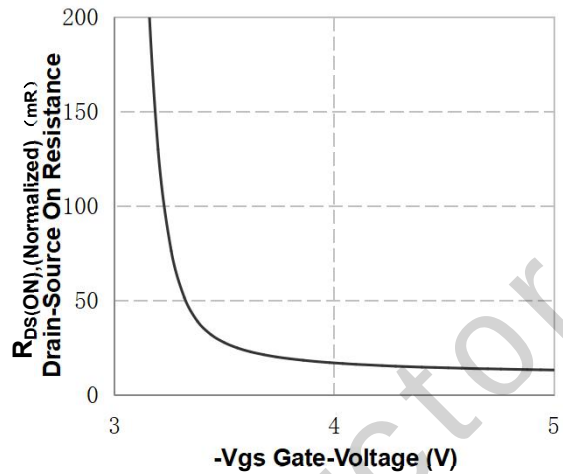


Figure 8. On-Resistance Variation vs Gate Voltage

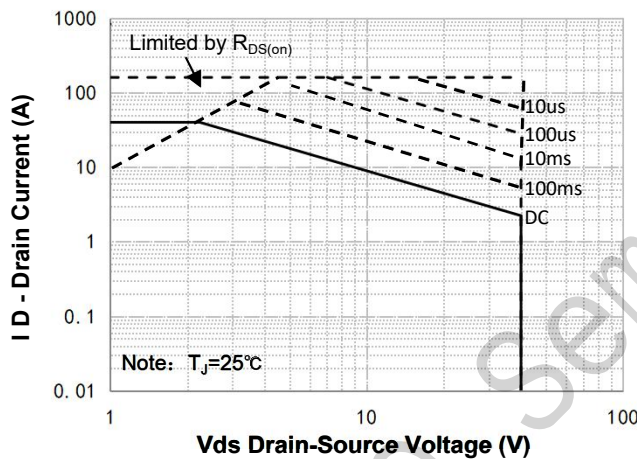


Figure 9. Maximum Safe Operating Area

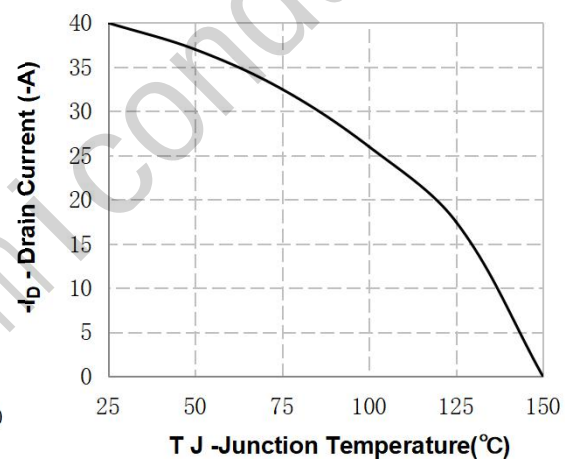


Figure 10. Maximum Continuous Drain Current vs Case Temperature

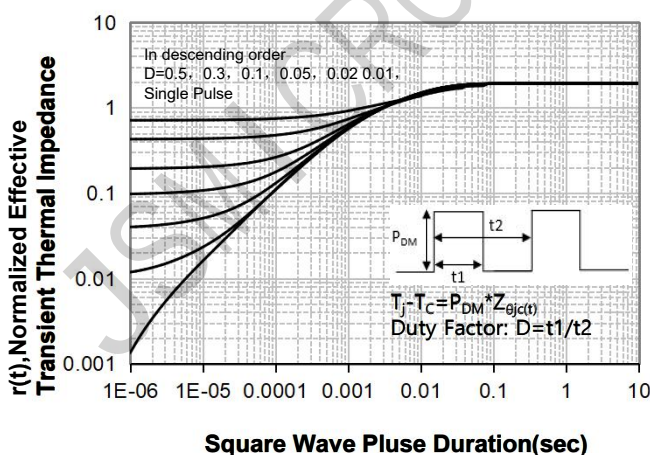
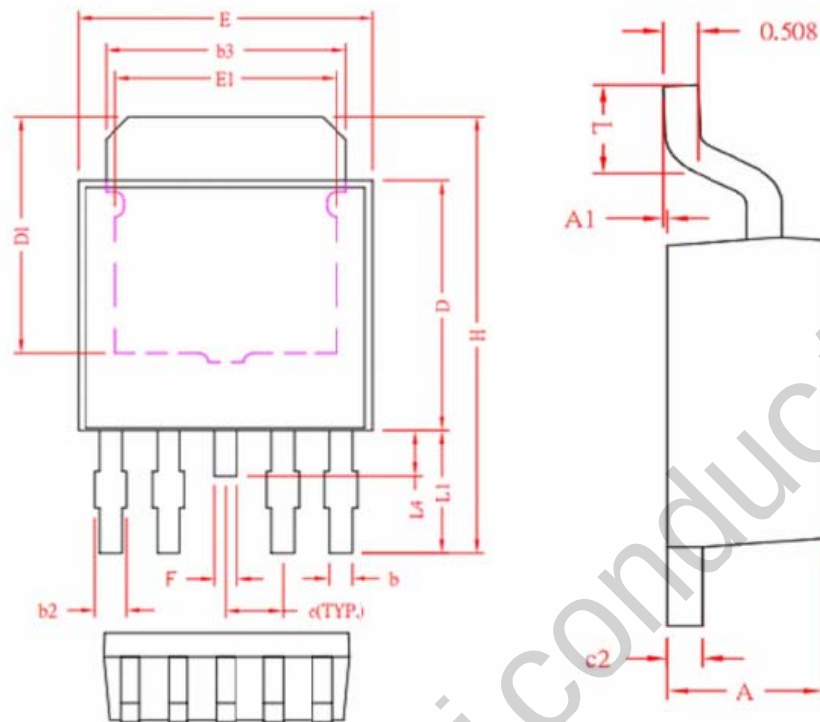


Figure 11. Transient Thermal Response Curve

外形尺寸图 / TO252-4L Package Dimensions



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0	0.08	0.15
b	0.45	0.53	0.60
b2	0.50	0.65	0.80
b3	5.20	5.35	5.50
c2	0.45	0.50	0.55
D	5.40	5.60	5.80
D1	4.57	-	-
E	6.40	6.60	6.80
E1	3.81	-	-
e	1.27 REF.		
F	0.40	0.50	0.60
H	9.40	9.80	10.20
L	1.40	1.59	1.77
L1	2.40	2.70	3.00
L4	0.80	1.00	1.20