Features

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

Product Summery

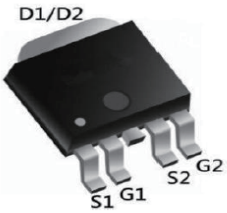
RoHS

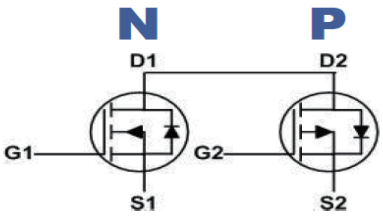
BVDSS	RDSON	ID
30V	15mΩ	20A
-30V	25mΩ	-23A

Description

The 3020 is th high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The 3020 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

TO252-4 Pin Configuration





Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	N-Ch	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	20	-23	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1]	15	-14	A
I_{DM}	Pulsed Drain Current[2]	60	-60	A
EAS	Single Pulse Avalanche Energy[3]	26.6	38	mJ
P_D@T_C=25°C	Total Power Dissipation[4]	20.8	20.8	W
P_D@T_A=25°C	Total Power Dissipation[4]	2	2	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	6	°C/W

N-Channel Electrical Characteristics T_J=25°C unless otherwise s ecified

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25°C , I_D=1mA	---	0.023	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=10A	---	15	20	mΩ
		V_{GS}=4.5V , I_D=6A	---	20	25	
$V_{GS(th)}$	Gate Threshold Voltage		1	---	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	V_{GS}=V_{DS} , I_D =250uA	---	-4.2	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55°C	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}= ±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=10A	---	14	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.3	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=20V , V_{GS}=4.5V , I_D=10A	---	5	---	nC
Q_{gs}	Gate-Source Charge		---	1.11	---	
Q_{gd}	Gate-Drain Charge		---	2.61	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=12V , V_{GS}=10V , R_G=3.3Ω I_D=6A	---	7.7	---	ns
T_r	Rise Time		---	46	---	
$T_{d(off)}$	Turn-Off Delay Time		---	11	---	
T_f	Fall Time		---	3.6	---	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	416	---	pF
C_{oss}	Output Capacitance		---	62	---	
C_{rss}	Reverse Transfer Capacitance		---	51	---	

Diode Characteristics

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	20	A
I_{SM}	Pulsed Source Current[2,5]		---	---	40	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1.2	V

Note :
1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition isV_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=20A
4.The power dissipation is limited by 150°C junctiontemperature
5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

P-Channel Electrical Characteristics (T_J=25°Cunless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.021	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance2	V_{GS}=-10V , I_D=-8A	---	25	30	mΩ
		V_{GS}=-4.5V , I_D=-6A	---	30	35	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1	---	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.2	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}= ±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-8A	---	12.6	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz		15	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-20V , V_{GS}=-4.5V , I_D=-6A	---	9.8	---	nC
Q_{gs}	Gate-Source Charge		---	2.2	---	
Q_{gd}	Gate-Drain Charge		---	3.4	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-24V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	16.4	---	ns
T_r	Rise Time		---	20.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	55	---	
T_f	Fall Time		---	10	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	930	---	pF
C_{oss}	Output Capacitance		---	148	---	
C_{rss}	Reverse Transfer Capacitance		---	115	---	

Diode Characteristics

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
I_S	Continuous Source Current1,5	V_G=V_D=0V , Force Current	---	---	-23	A
I_{SM}	Pulsed Source Current2,5		---	---	-35	A
V_{SD}	Diode Forward Voltage2	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note :

1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper. 2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=-25V,V_{GS}=-10V,L=0.1mH,IAS=-30A

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Channel Typical Performance Characteristics

Figure1:Output Characteristics

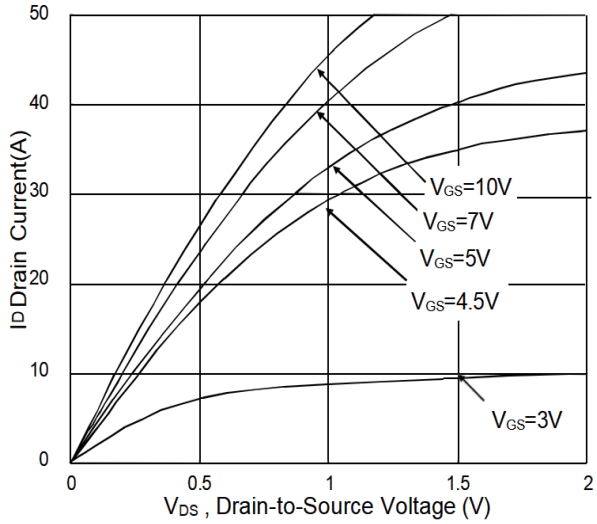


Figure 2: On-Resistance vs. Gate-Source

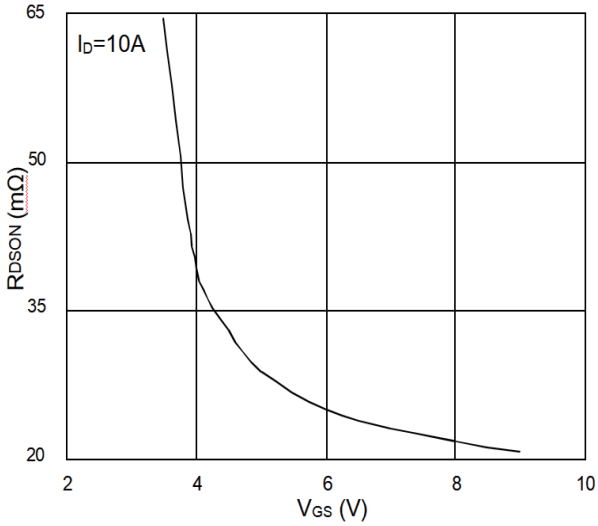


Figure 3:Forward Characteristics Of Reve

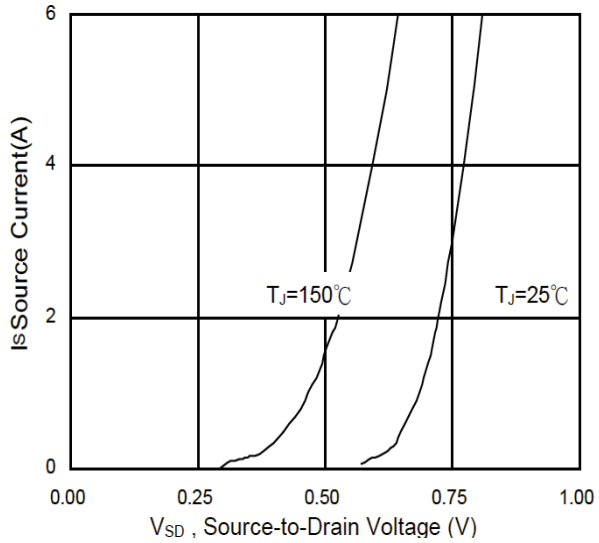


Figure 4: Gate-Charge Characteristics

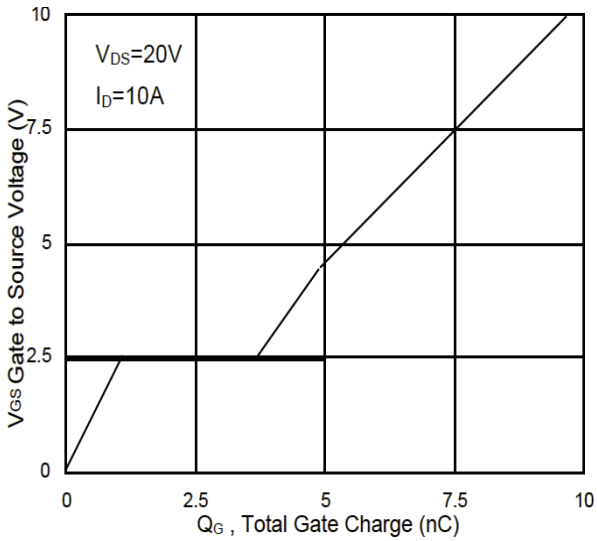


Figure 5:Normalized VGS(th) vs. TJ

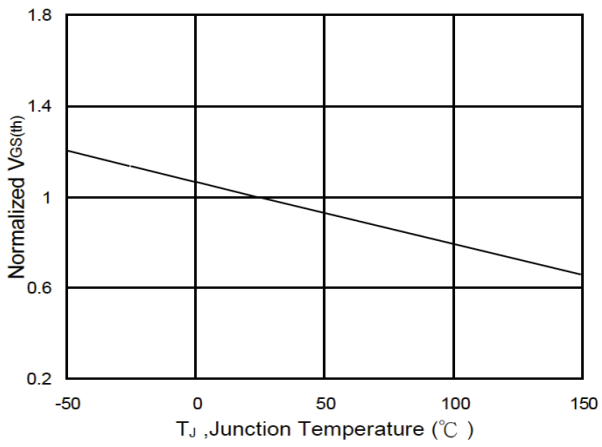
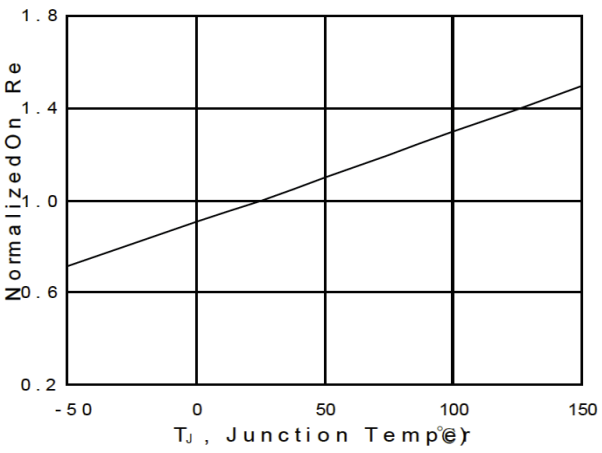


Figure 6: Normalized RDSON vs. TJ



N-Channel Typical Performance Characteristics

Figure7:Capacitance

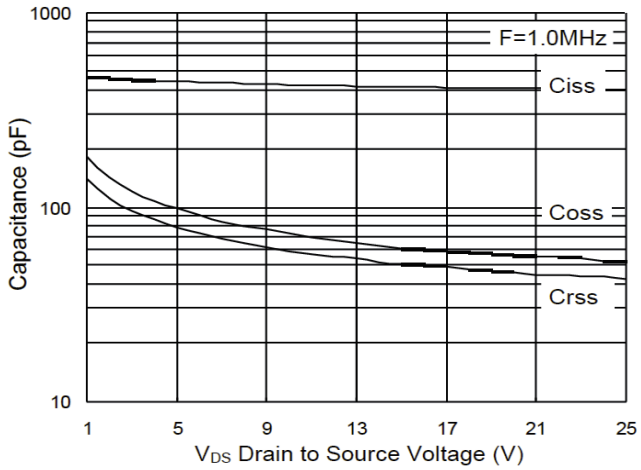


Figure 8 Safe Operating Area

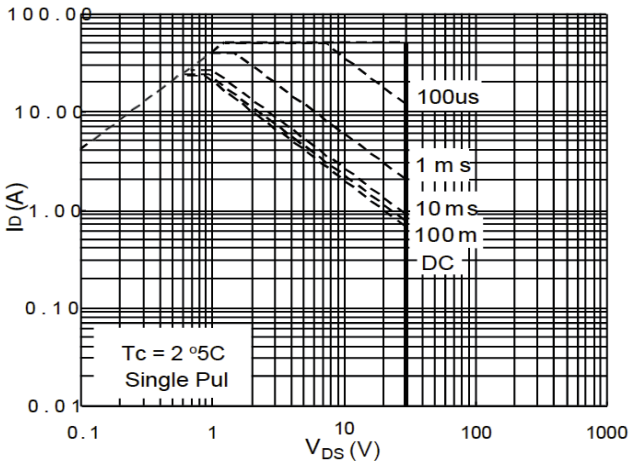


Figure9:Normalized Maximum Transient

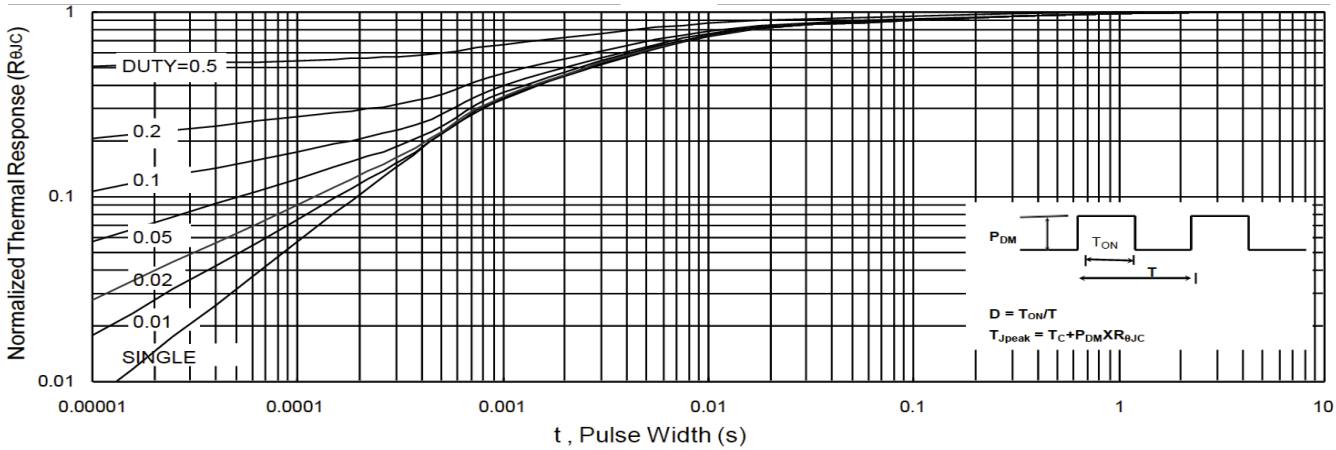


Figure10:Switching Time Waveform

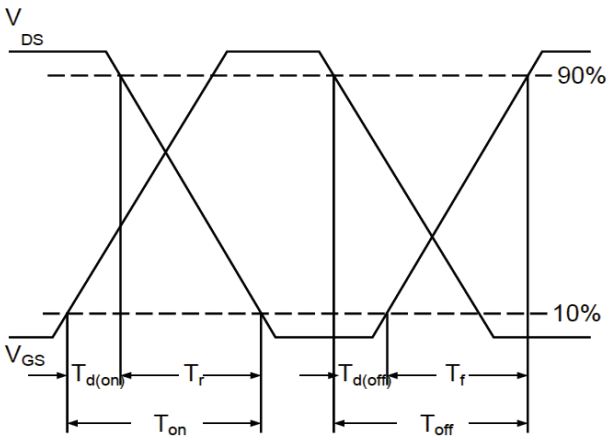
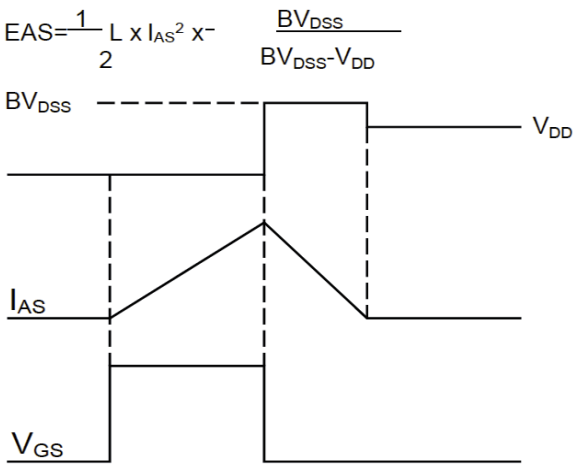


Figure11:Unclamped Inductive Switchin



P-Channel Typical Performance Characteristics

Figure1:Capacitance

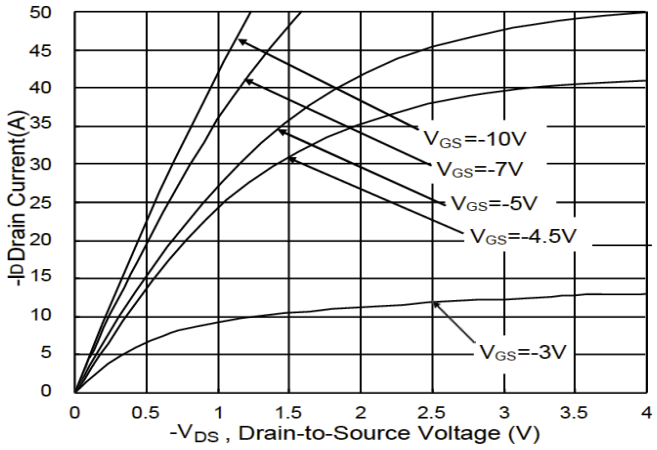


Figure 2:On-Resistance v.s Gate-Source

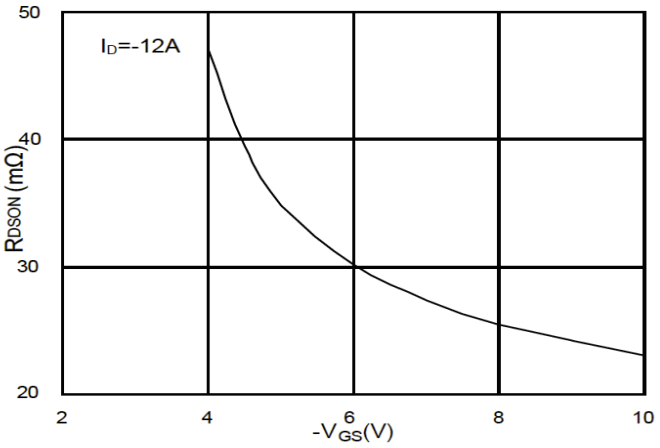


Figure3:Forward Characteristics Of Rever

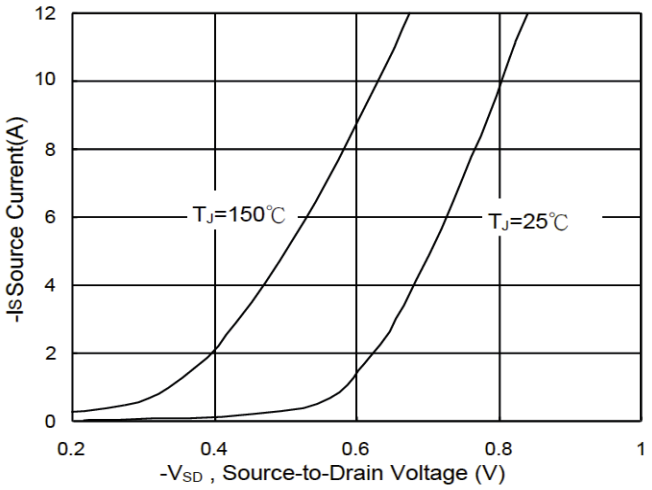


Figure4:Gate-Charge Characteristics

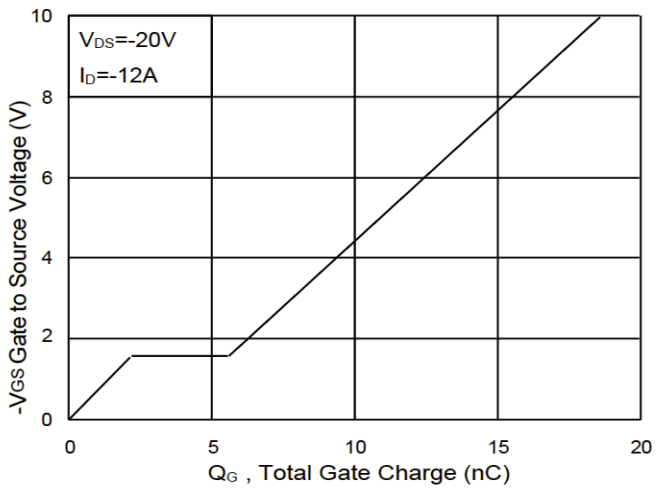


Figure5:Normalized VGS(th) v.s TJ

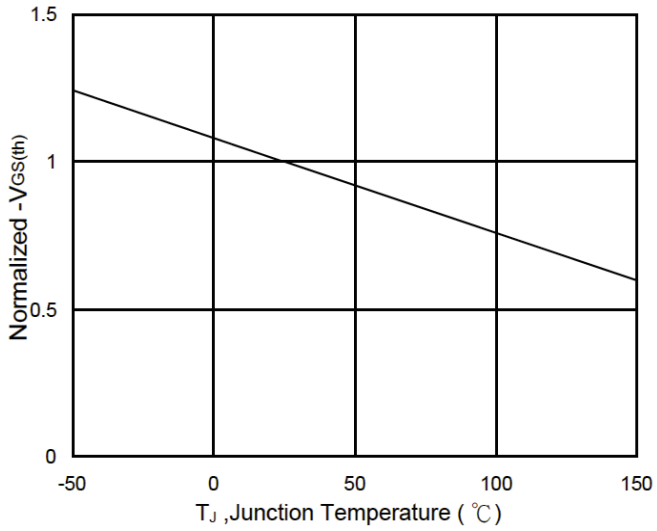
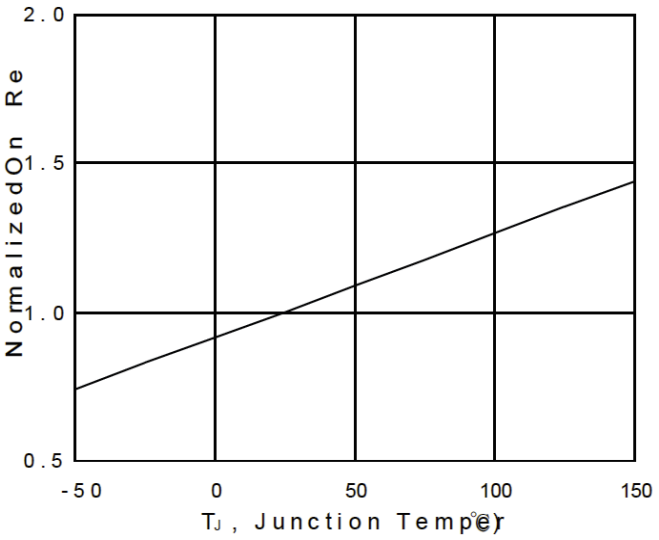


Figure 6:Normalized RDSON v.s TJ



P-Channel Typical Performance Characteristics

Figure7:Capacitance

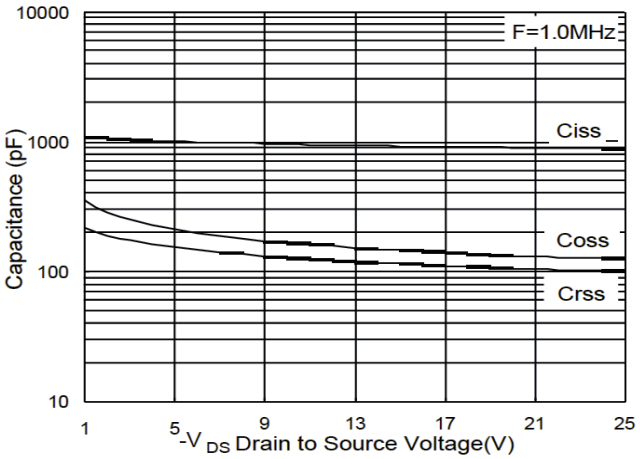


Figure 8: Safe Operating Areare

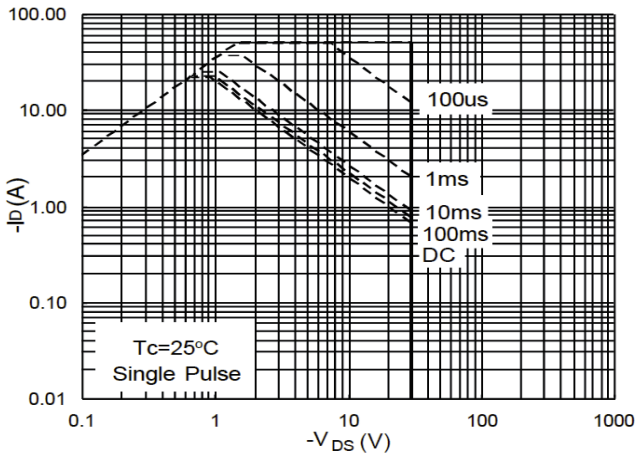


Figure 9:Normalized Maximum Transient

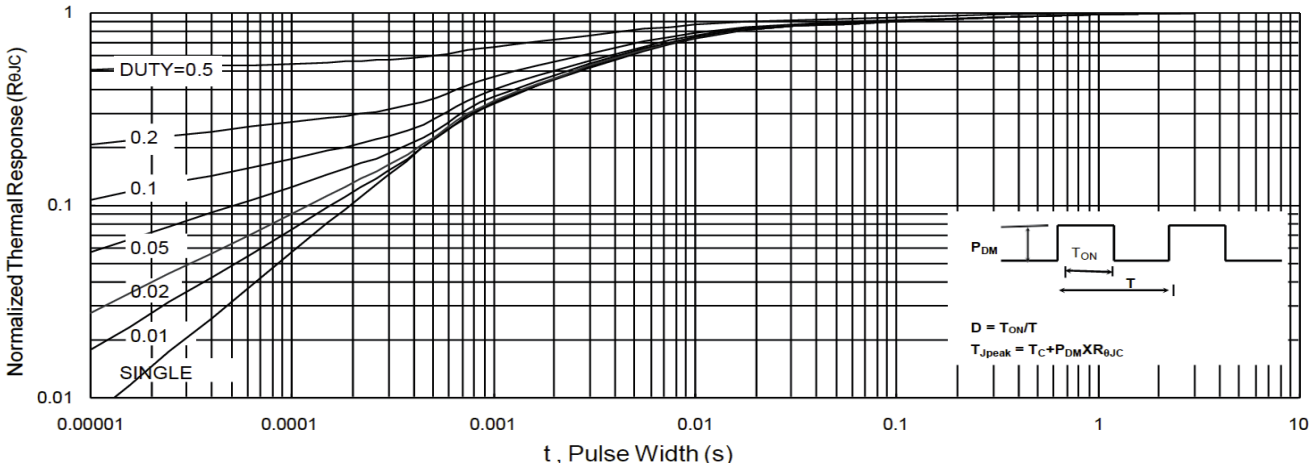


Figure 10:Switching Time Waveformse

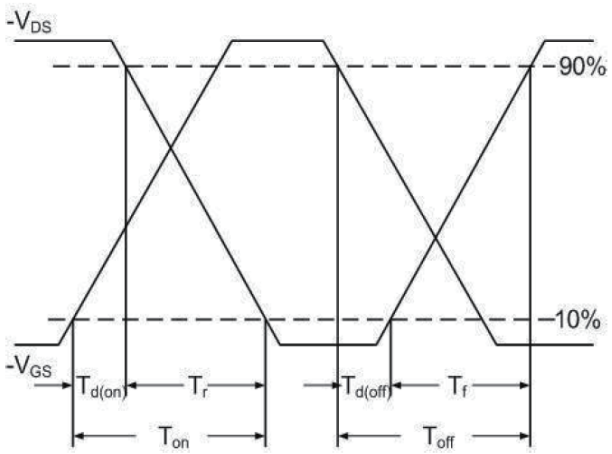
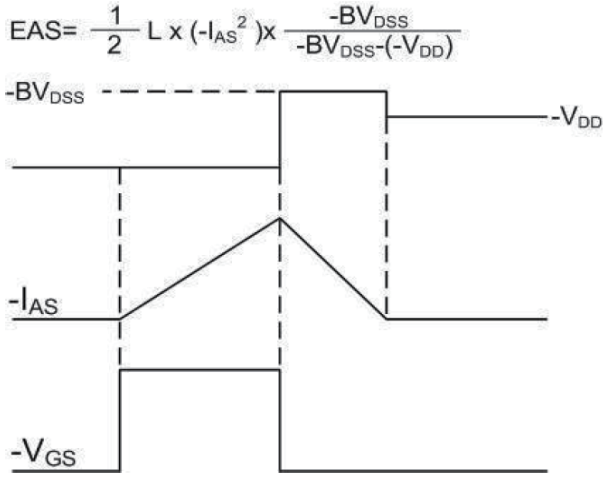
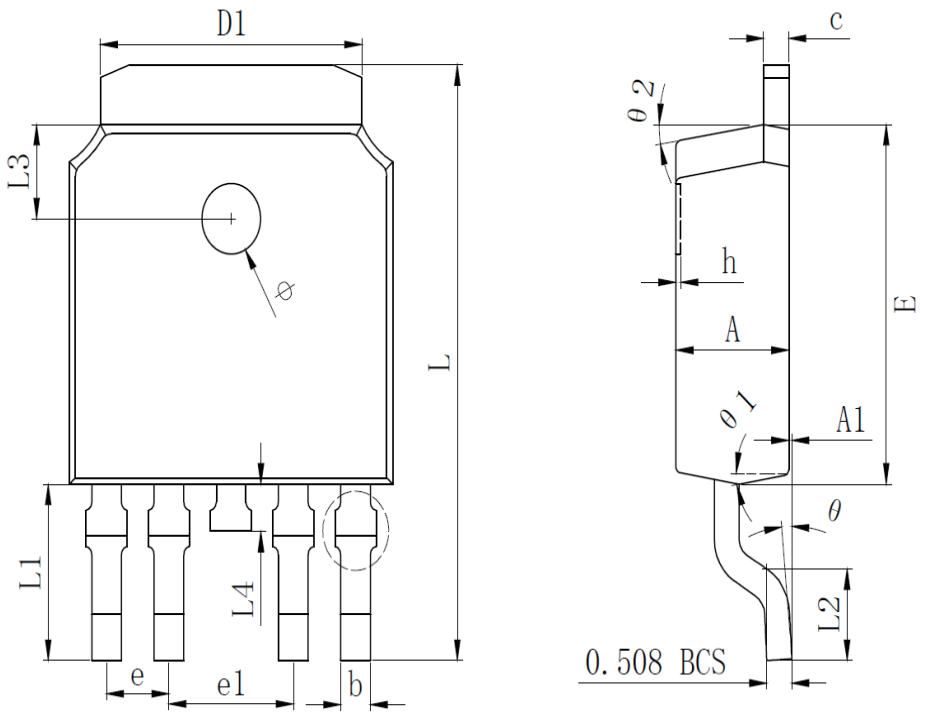
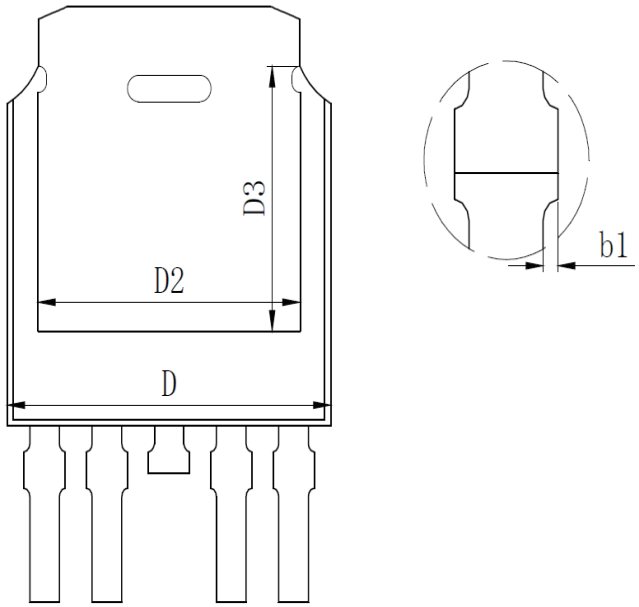


Figure 11:Unclamped Inductive Switchin



Mechanical Dimensions for TO-252-4L





SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		