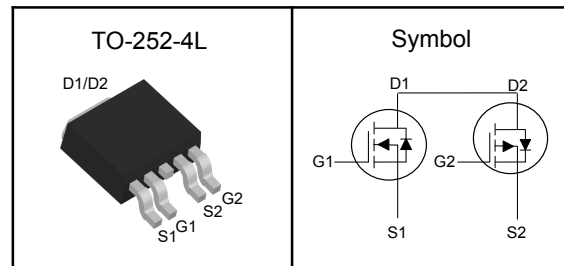


Dual N+P Channel Enhancement Mode MOSFET
Features

- Low Rdson for low conduction loss
- Reliable and Rugged
- ROHS Compliant & Halogen-Free

Applications

- Power Management in Desktop Computer
- DC/DC Converters

Pin Description


V _{DSS}	40	-40	V
R _{DS(ON)-Typ}	15	30	mΩ
I _D	28	-25	A

Absolute Maximum Ratings(T_C=25°C, Unless Otherwise Noted)

Symbol	Parameter	N-Channel	P-Channel	Unit
V _{DSS}	Drain-Source Voltage	40	-40	V
V _{GSS}	Gate-Source Voltage	±20	±20	V
T _J	Maximum Junction Temperature	-55 to 150	-55 to 150	°C
T _{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
I _{DM} ^①	Pulse Drain Current Tested	46	-40	A
I _D	Continuous Drain Current	28	-25	A
P _D	Maximum Power Dissipation	25	31.3	W
E _{AS}	Single Pulse Avalanche Energy	28	66	mJ
I _{AS}	Avalanche Current	17.8	-27.2	A

Thermal Characteristics

Symbol	Parameter	Rating	Unit
R _{θJA} ^③	Thermal Resistance-Junction to Ambient	62	°C/W
R _{θJC}	Thermal Resistance Junction-Case	5.0	°C/W

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C.

Note ③ : Surface Mounted on 1in² FR-4 board with 1oz.



Dual N+P Channel Enhancement Mode MOSFET

Electrical Characteristics ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=32V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	---	2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=5A$	---	15	26	m Ω
		$V_{GS}=4.5V, I_D=4A$	---	22	35	
gfs	Forward Transconductance	$V_{DS}=5V, I_D=5A$	---	14	---	S
Dynamic Characteristics^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=15V, \text{Freq.}=1\text{MHz}$	---	593	---	pF
C_{oss}	Output Capacitance		---	76	---	
C_{rss}	Reverse Transfer Capacitance		---	56	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	8.9	---	nS
T_r	Turn-on Rise Time		---	2.2	---	
$T_{d(off)}$	Turn-off Delay Time		---	41	---	
T_f	Turn-off Fall Time		---	2.7	---	
Q_g	Total Gate Charge(4.5V)	$V_{DS}=20V, V_{GS}=4.5V, I_D=5A$	---	5.5	---	nC
Q_{gs}	Gate-Source Charge		---	1.25	---	
Q_{gd}	Gate-Drain Charge		---	2.5	---	
Source-Drain Characteristics						
$V_{SD}^{④}$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	6.1	A
I_{SM}	Pulsed Source Current		---	---	23	A

Note ④: Pulse test (pulse width 300 μs , duty cycle 2%).

Note ⑤: Guaranteed by design, not subject to production testing.



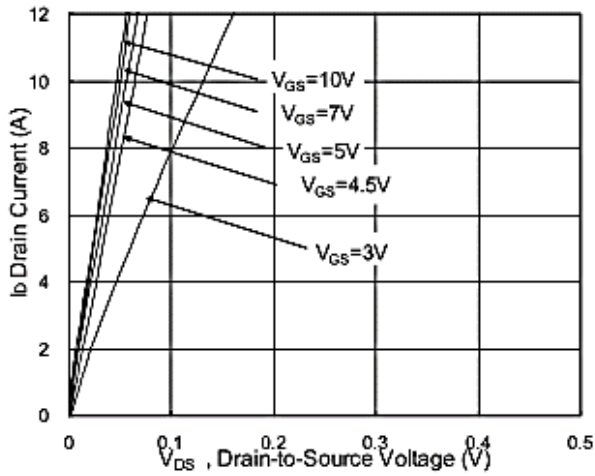
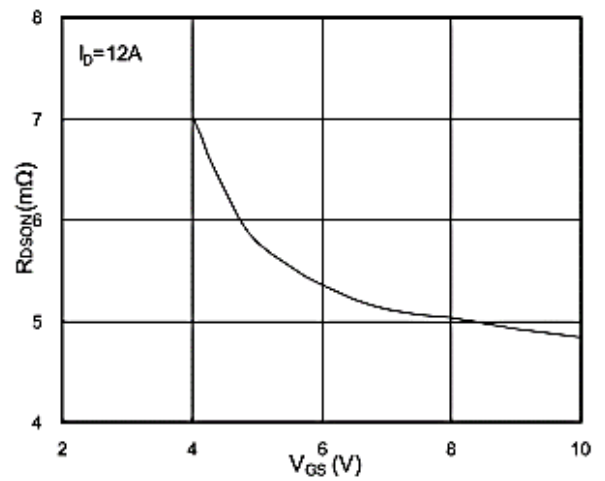
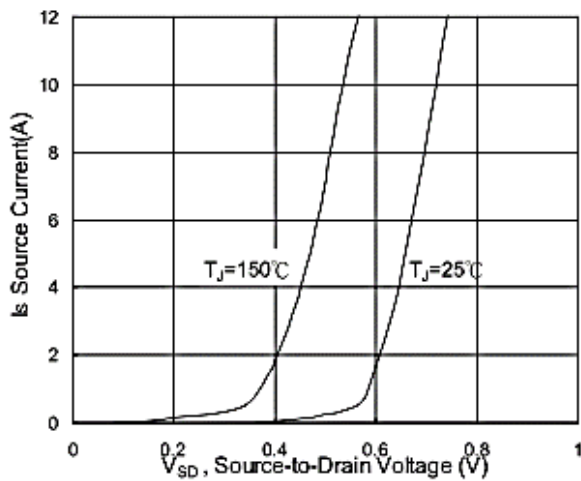
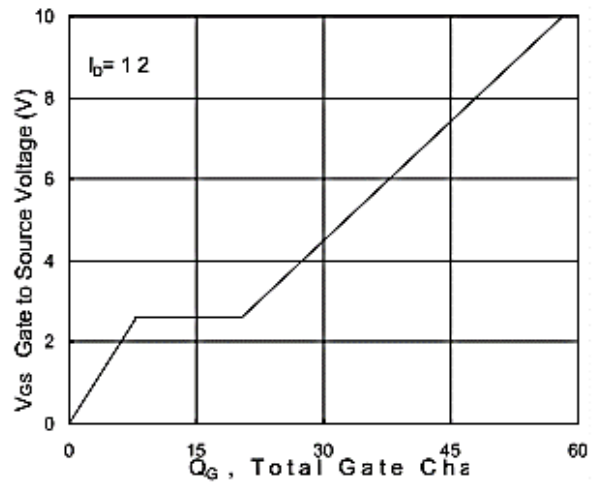
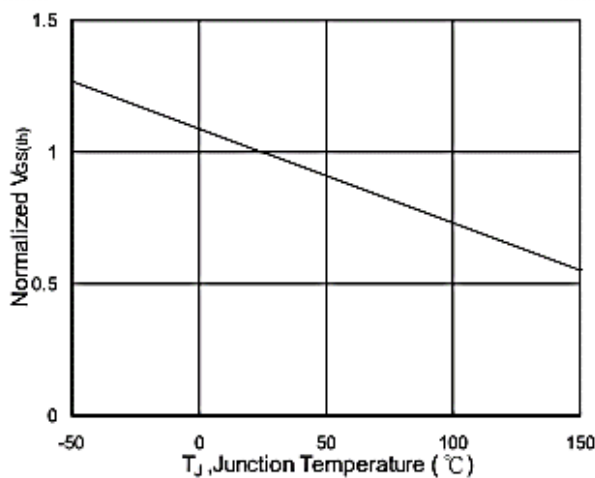
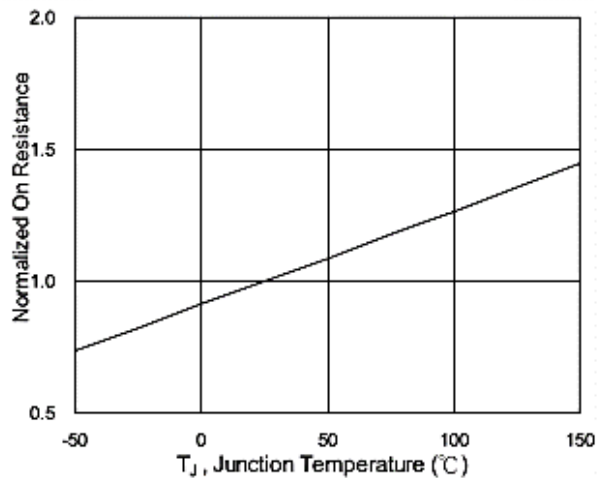
Dual N+P Channel Enhancement Mode MOSFET

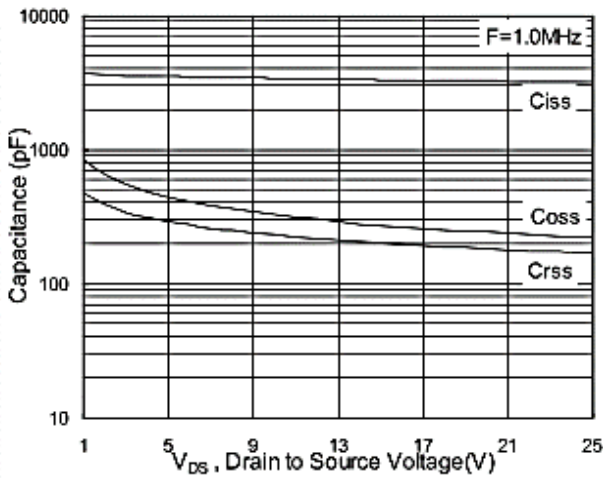
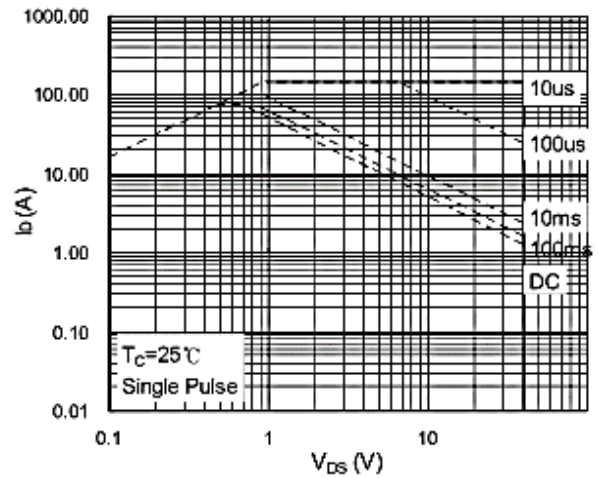
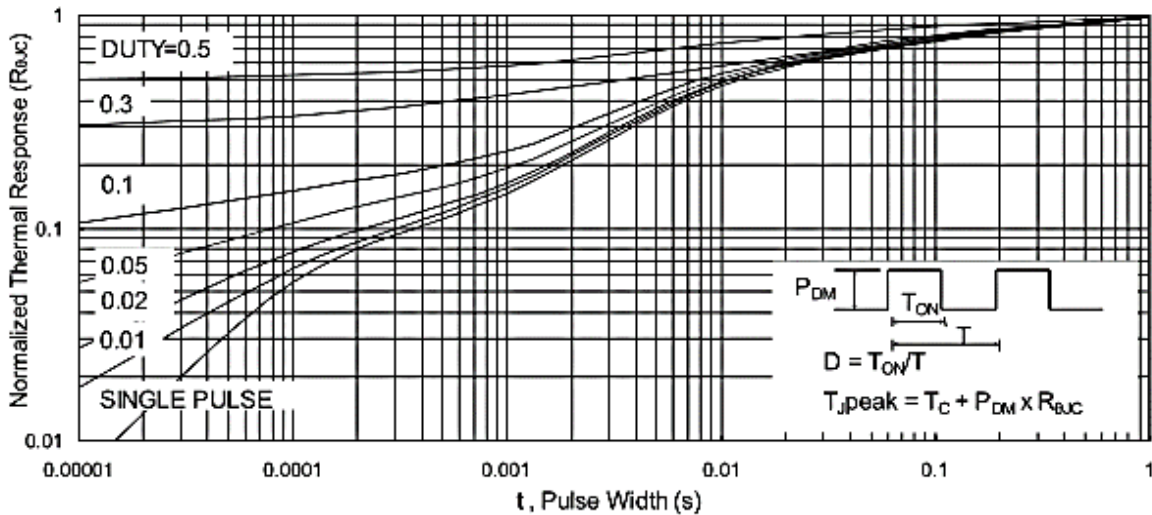
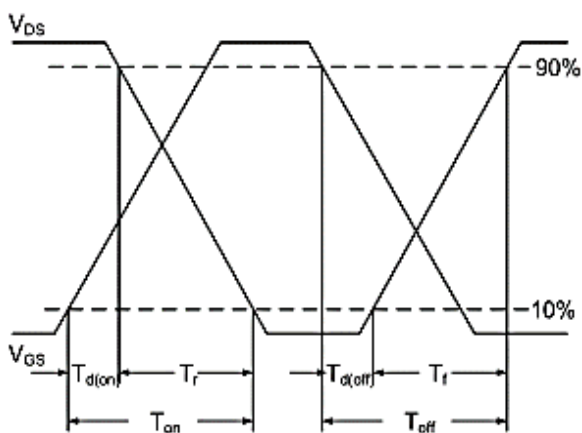
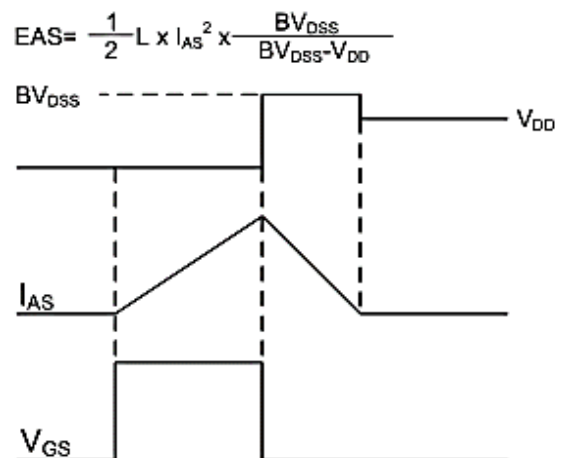
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-32V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	---	-2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_D=-6A$	---	30	42	m Ω
		$V_{GS}=-4.5V, I_D=-3A$	---	48	60	
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-6A$	---	13	---	S
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-15V,$ Freq.=1MHz	---	1415	---	pF
C_{oss}	Output Capacitance		---	134	---	
C_{riss}	Reverse Transfer Capacitance		---	102	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=-15V,$ $V_{GS}=-10V,$ $R_G=3.3\Omega, I_D=-1A$	---	22	---	nS
T_r	Turn-on Rise Time		---	15.7	---	
$T_{d(off)}$	Turn-off Delay Time		---	59	---	
T_f	Turn-off Fall Time		---	5.5	---	
Q_g	Total Gate Charge	$V_{DS}=-20V,$ $V_{GS}=-4.5V, I_D=-6A$	---	11.5	---	nC
Q_{gs}	Gate-Source Charge		---	3.5	---	
Q_{gd}	Gate-Drain Charge		---	3.3	---	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1.2	V
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-6	A
I_{SM}	Pulsed Source Current		---	---	-22	A

Note ④: Pulse test (pulse width 300us, duty cycle 2%).

Note ⑤: Guaranteed by design, not subject to production testing.

Dual N+P Channel Enhancement Mode MOSFET
N-Channel Typical Characteristics

Fig.1 Typical Output Characteristics

Fig.2 On-Resistance vs. G-S Voltage

Fig.3 Forward Characteristics Of Reverse

Fig.4 Gate-Charge Characteristics

Fig.5 Normalized $V_{GS(th)}$ vs. T_J

Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Dual N+P Channel Enhancement Mode MOSFET

Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

Fig.10 Switching Time Waveform

Fig.11 Unclamped Inductive Switching Wave

Dual N+P Channel Enhancement Mode MOSFET

P-Channel Typical Characteristics

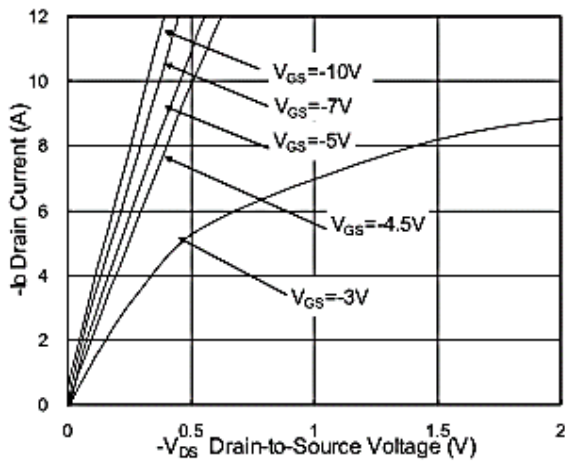


Fig.1 Typical Output Characteristics

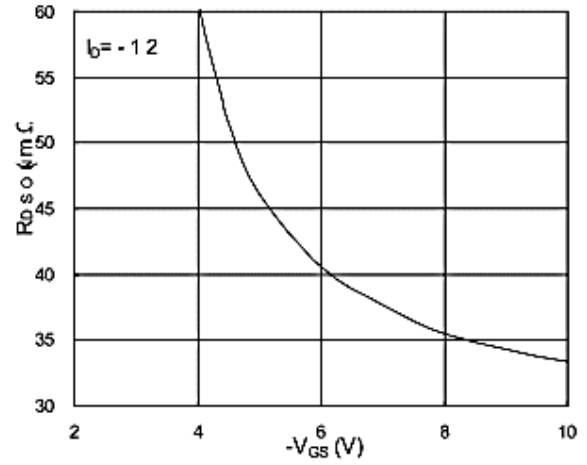


Fig.2 On-Resistance v.s Gate-Source

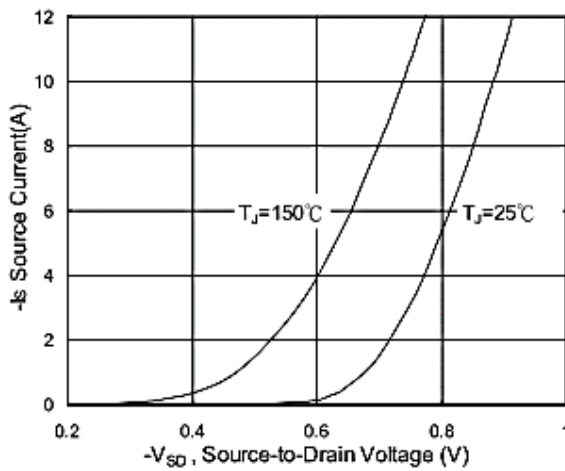


Fig.3 Forward Characteristics of Reverse

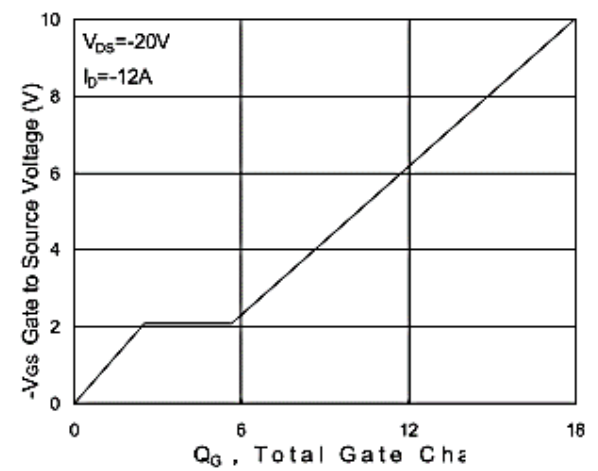


Fig.4 Gate-Charge Characteristics

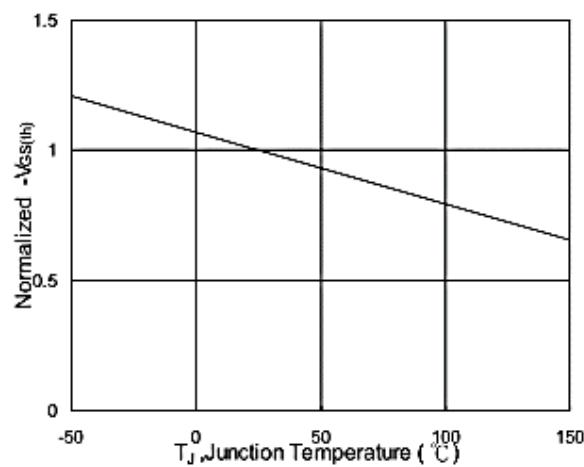


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

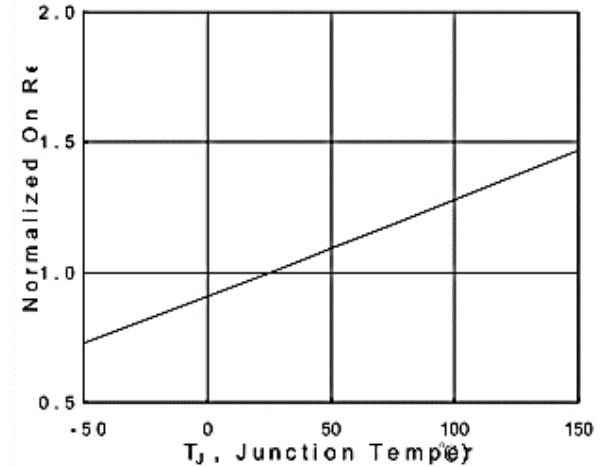
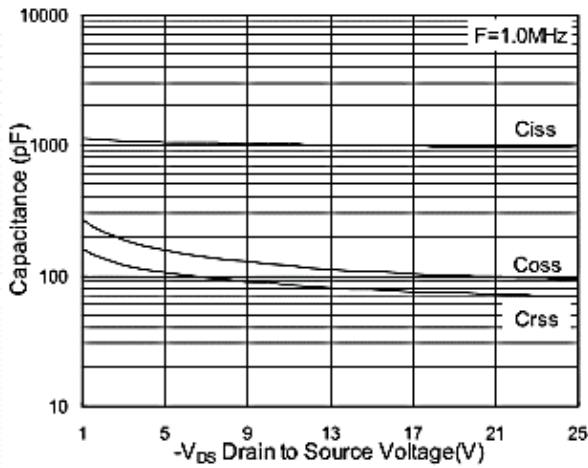
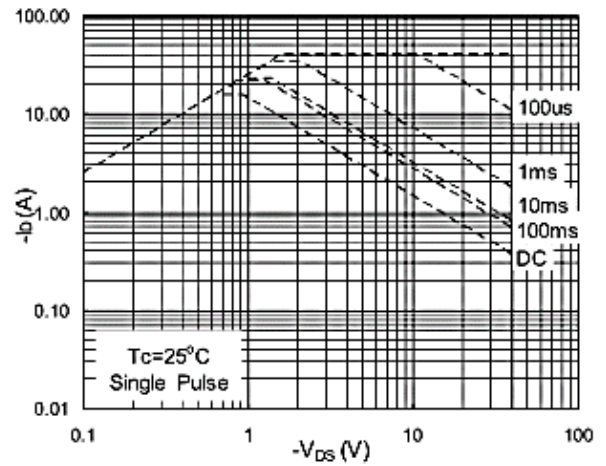
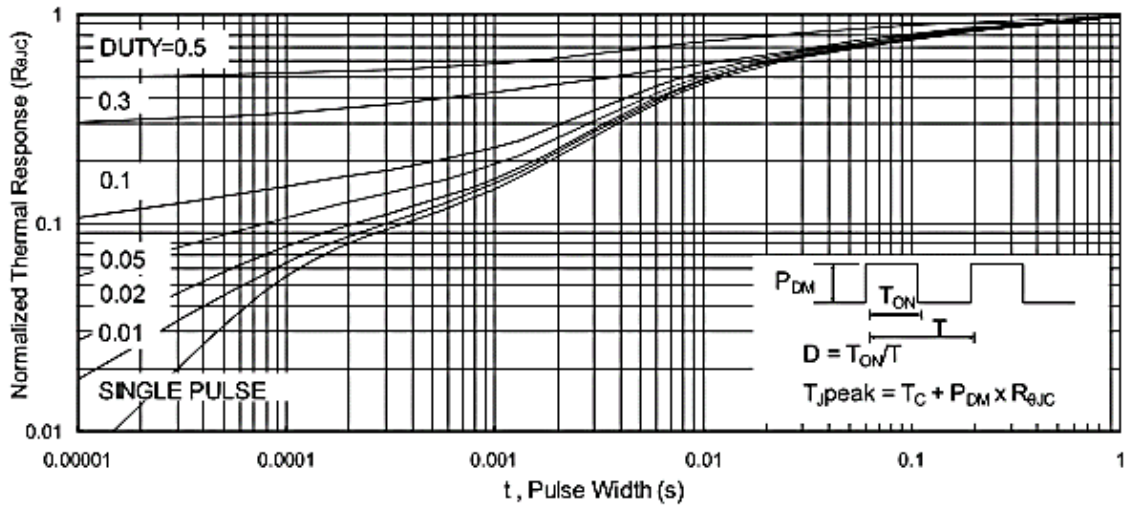
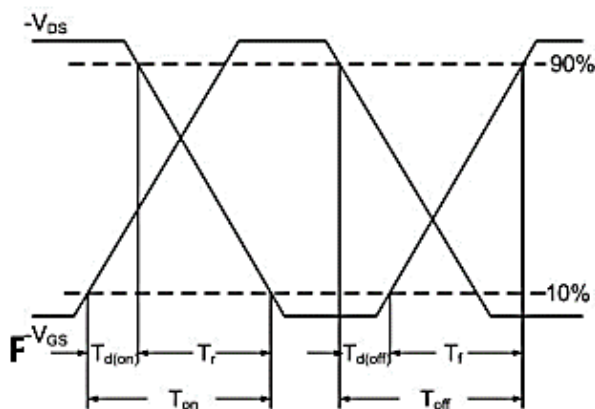
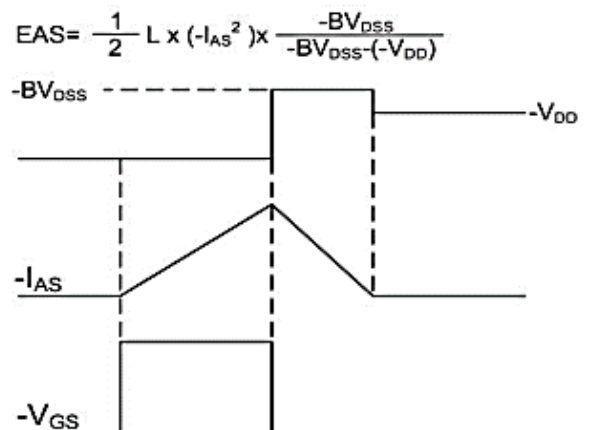
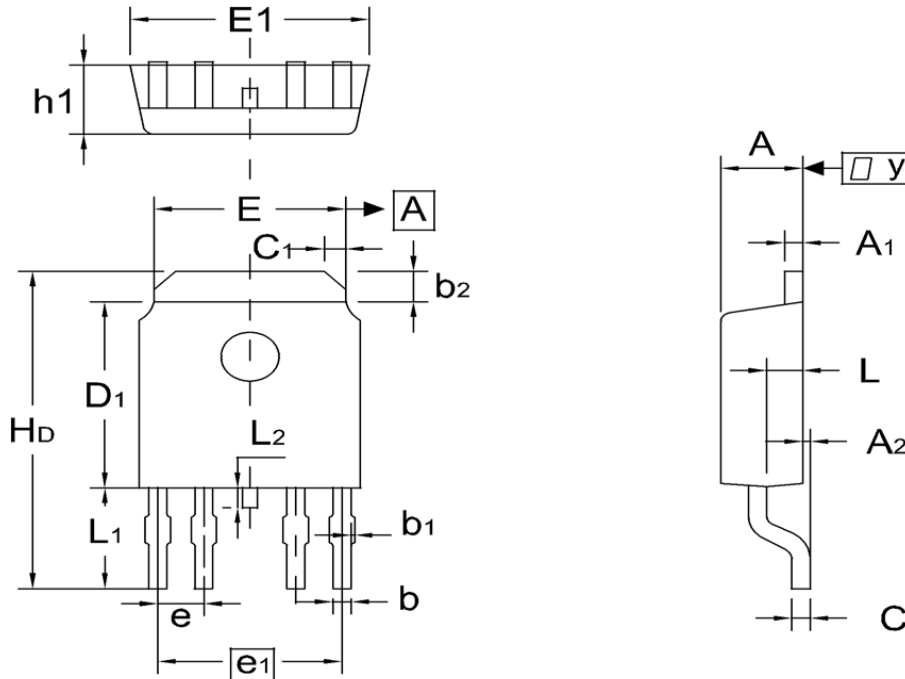


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Dual N+P Channel Enhancement Mode MOSFET

Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

Fig.10 Switching Time Waveform

Fig.11 Unclamped Inductive Waveform

Dual N+P Channel Enhancement Mode MOSFET
TO-252-4L Package Outline Dimensions

DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.1	2.3	2.5	A₁	0.4	0.5	0.6
A₂	--	--	0.3	b	0.4	0.5	0.6
b₁	--	--	0.1	b₂	0.8	1.0	1.2
C	0.4	0.5	0.6	C₁	0.4	0.6	0.8
D₁	5.7	6.1	6.5	E	5.0	5.3	5.6
E₁	6.3	6.6	6.9	e	--	1.27	--
e₁	--	5.08	--	H_D	9.6	10.0	10.4
h₁	2.1	2.3	2.5	L	0.80	1.0	1.2
L₁	2.6	2.9	3.2	L₂	0.35	0.65	0.95