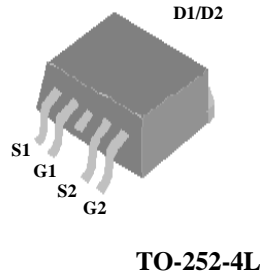




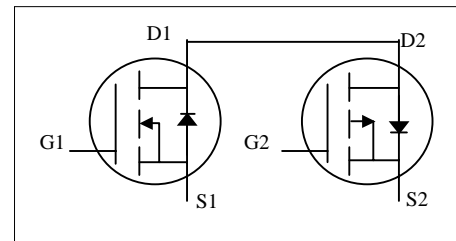
- ▼ Simple Drive Requirement
- ▼ Good Thermal Performance
- ▼ Fast Switching Performance



N-CH	BV_{DSS}	40V
	$R_{DS(ON)}$	32m Ω
	I_D	7.4A
P-CH	BV_{DSS}	-40V
	$R_{DS(ON)}$	90m Ω
	I_D	-4.7A

Description

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D@T_A=25^\circ C$	Continuous Drain Current ³	7.4	-4.7	A
$I_D@T_A=70^\circ C$	Continuous Drain Current ³	6.1	-3.7	A
I_{DM}	Pulsed Drain Current ¹	40	-40	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	3.125		W
	Linear Derating Factor	0.025		W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150		$^\circ C$

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	12	$^\circ C/W$
Rthj-a	Maximum Thermal Resistance, Junction-ambient ³	40	$^\circ C/W$



AP4531GH

N-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=6A$	-	-	32	$m\Omega$
		$V_{GS}=4.5V, I_D=4A$	-	-	45	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=6A$	-	6	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=40V, V_{GS}=0V$	-	-	10	μA
	Drain-Source Leakage Current ($T_j=70^\circ\text{C}$)	$V_{DS}=32V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=6A$	-	6.7	14	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=32V$	-	1.3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	3.4	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=20V$	-	4.5	-	ns
t_r	Rise Time	$I_D=6A$	-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	16	-	ns
t_f	Fall Time	$R_D=3.3\Omega$	-	2.8	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	450	720	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	70	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	50	-	pF
R_g	Gate Resistance	$f=1.0\text{MHz}$	-	1.5	2.3	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=2.4A, V_{GS}=0V$	-	-	1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=6A, V_{GS}=0V$	-	19	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	12	-	nC

**P-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-4A$	-	-	90	$m\Omega$
		$V_{GS}=-4.5V, I_D=-3A$	-	-	130	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-	-3	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-4A$	-	4	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=-40V, V_{GS}=0V$	-	-	-10	μA
	Drain-Source Leakage Current ($T_j=70^\circ\text{C}$)	$V_{DS}=-32V, V_{GS}=0V$	-	-	-25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=-4A$	-	6.4	10	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-32V$	-	1.4	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	3.5	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=-20V$	-	6.5	-	ns
t_r	Rise Time	$I_D=-4A$	-	13.5	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-10V$	-	20	-	ns
t_f	Fall Time	$R_D=5\Omega$	-	5	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	480	770	pF
C_{oss}	Output Capacitance	$V_{DS}=-25V$	-	60	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	50	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=-2.4A, V_{GS}=0V$	-	-	-1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=-4A, V_{GS}=0V$	-	22	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=-100A/\mu s$	-	17	-	nC

Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse test.
3. N-CH, P-CH are same, mounted on 2oz FR4 board $t \leq 10s$.

THIS PRODUCT IS AN ELECTROSTATIC SENSITIVE, PLEASE HANDLE WITH CAUTION.

THIS PRODUCT HAS BEEN QUALIFIED FOR CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENT IN LIFE SUPPORT DEVICE OR SYSTEM ARE NOT AUTHORIZED.



N-Channel

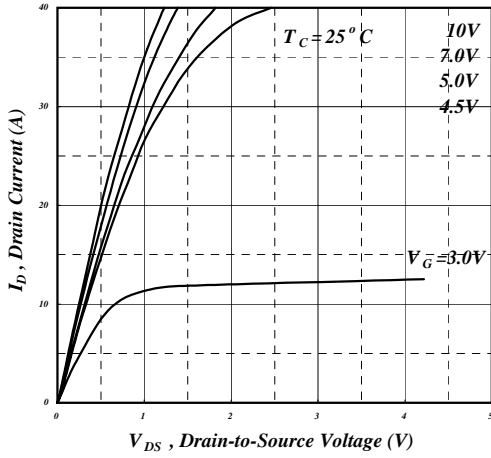


Fig 1. Typical Output Characteristics

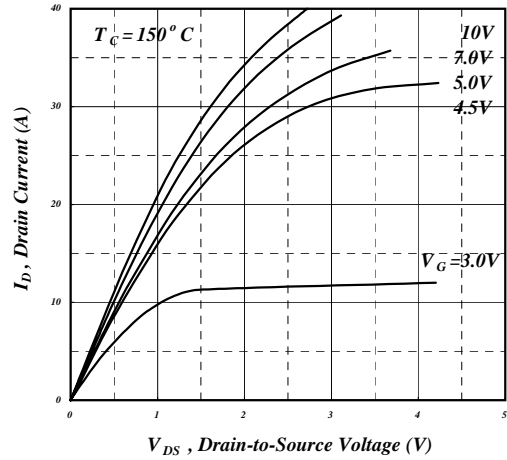


Fig 2. Typical Output Characteristics

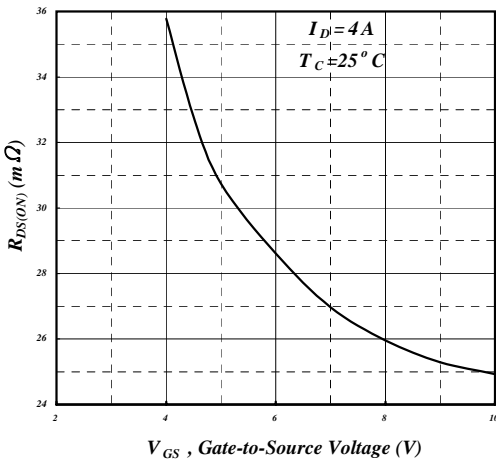


Fig 3. On-Resistance v.s. Gate Voltage

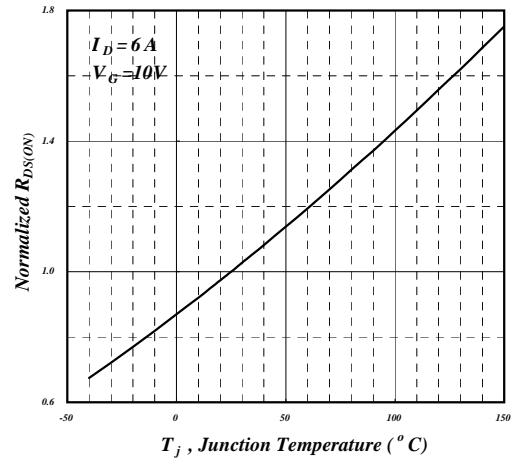


Fig 4. Normalized On-Resistance v.s. Junction Temperature

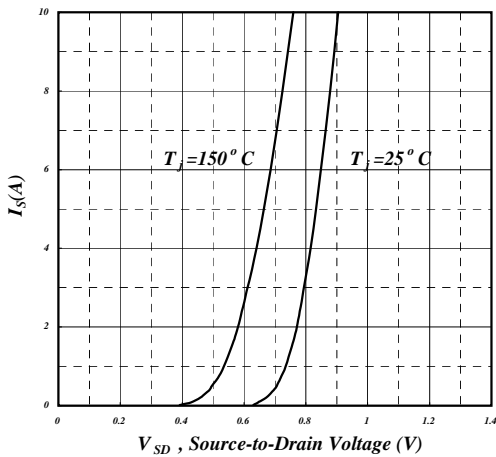


Fig 5. Forward Characteristic of Reverse Diode

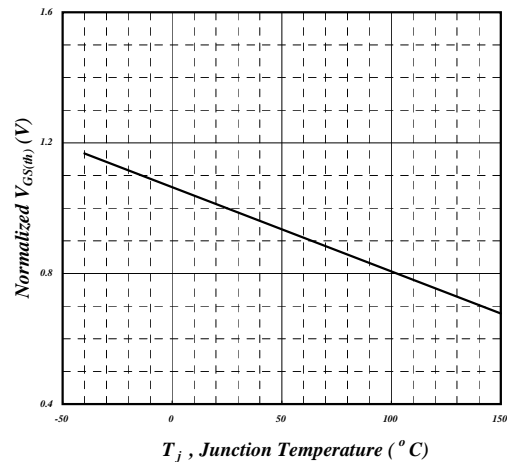


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



N-Channel

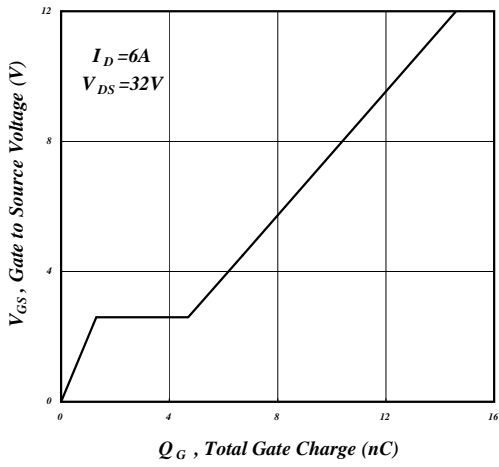


Fig 7. Gate Charge Characteristics

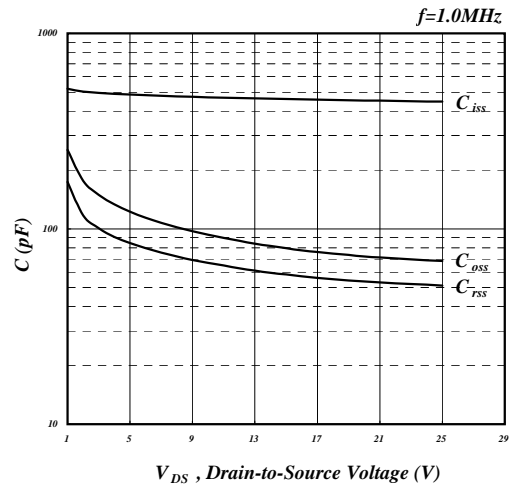


Fig 8. Typical Capacitance Characteristics

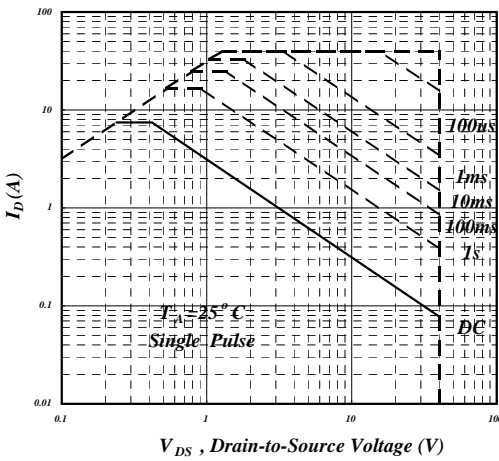


Fig 9. Maximum Safe Operating Area

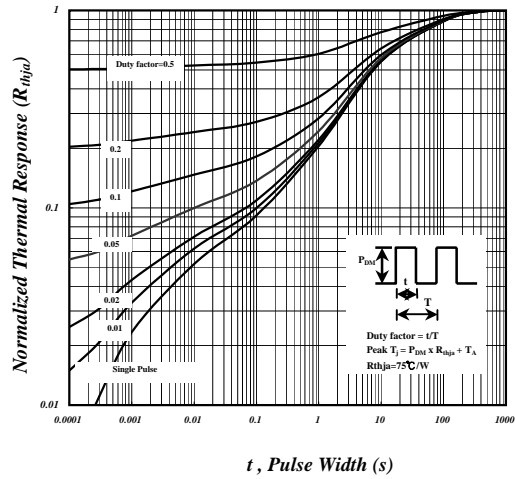


Fig 10. Effective Transient Thermal Impedance

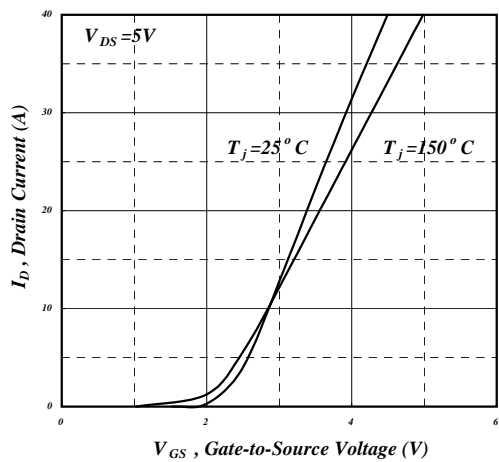


Fig 11. Transfer Characteristics

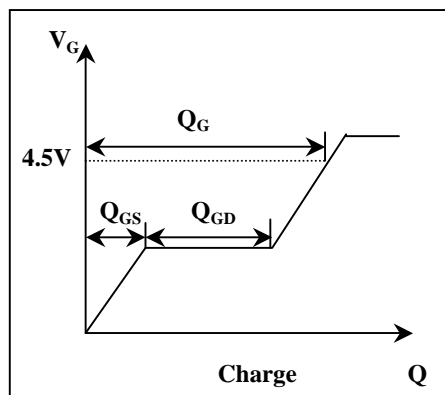


Fig 12. Gate Charge Waveform



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P-Channel

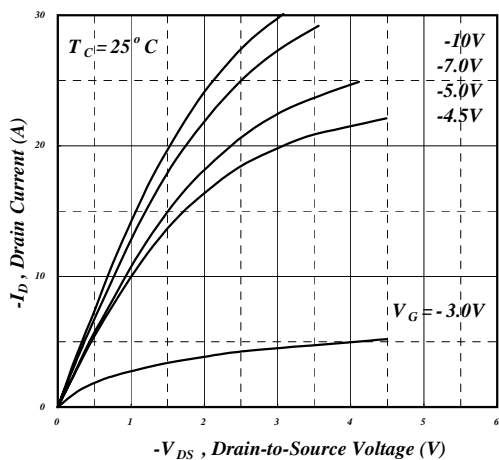


Fig 1. Typical Output Characteristics

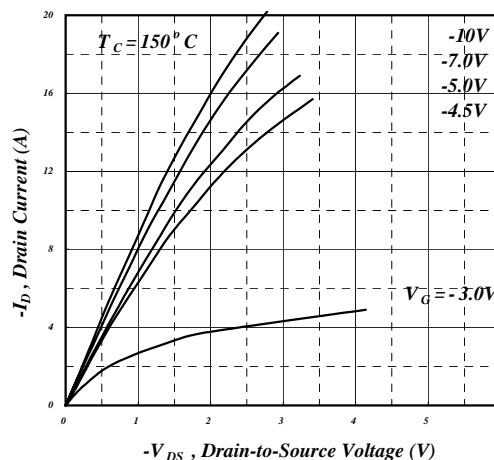


Fig 2. Typical Output Characteristics

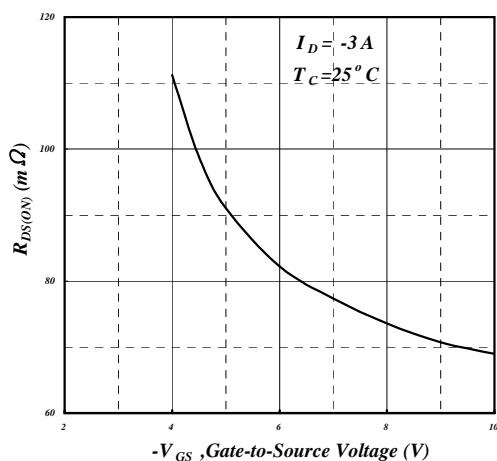


Fig 3. On-Resistance v.s. Gate Voltage

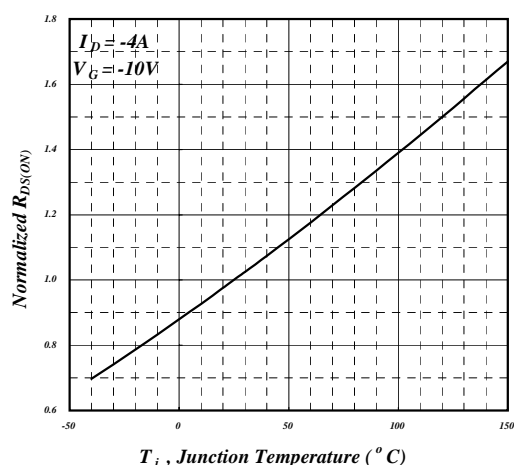


Fig 4. Normalized On-Resistance v.s. Junction Temperature

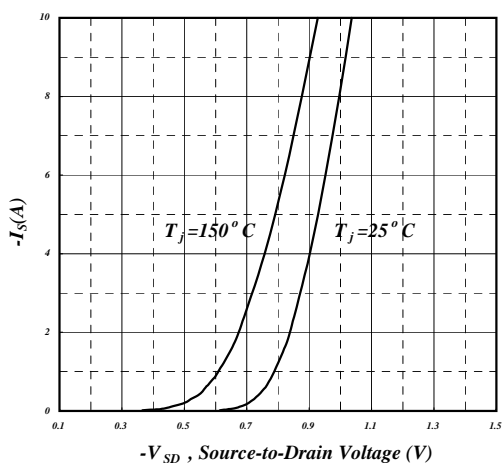


Fig 5. Forward Characteristic of Reverse Diode

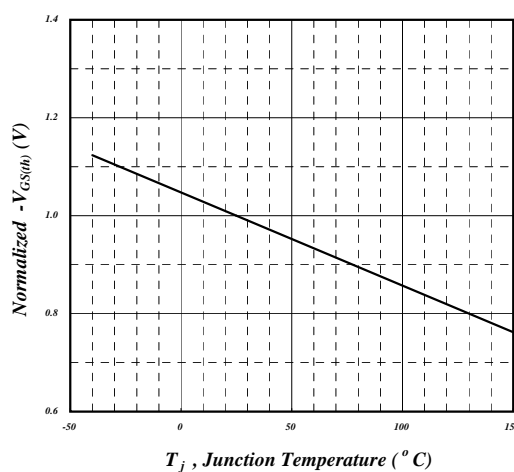


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



P-Channel

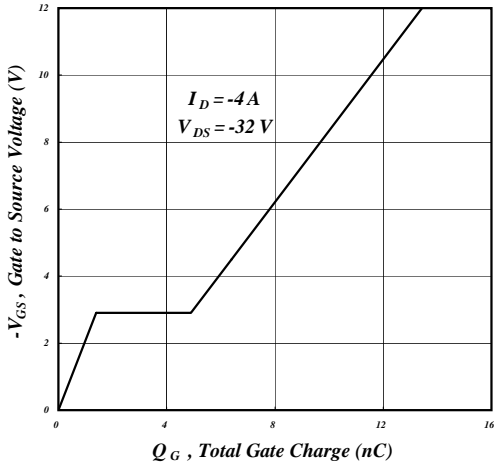


Fig 7. Gate Charge Characteristics

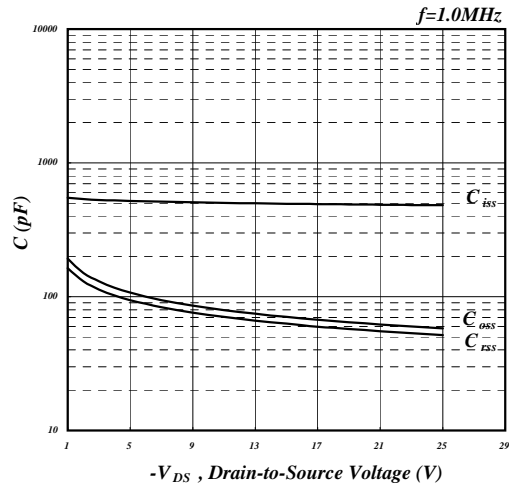


Fig 8. Typical Capacitance Characteristics

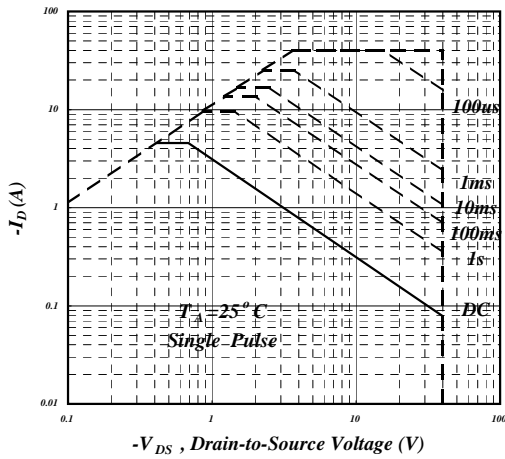


Fig 9. Maximum Safe Operating Area

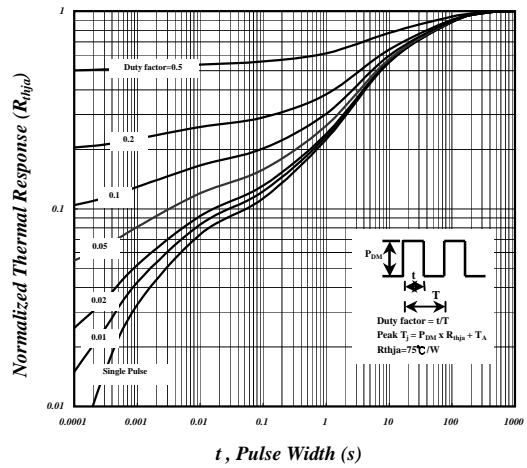


Fig 10. Effective Transient Thermal Impedance

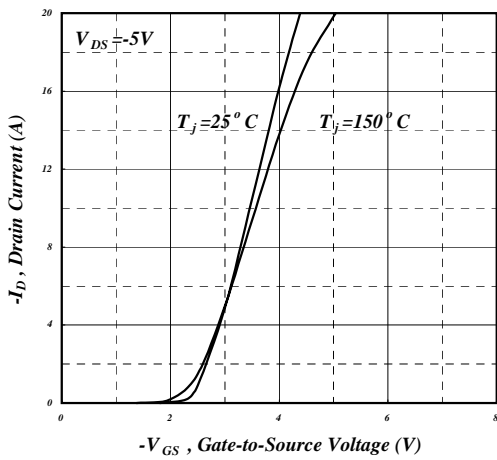


Fig 11. Transfer Characteristics

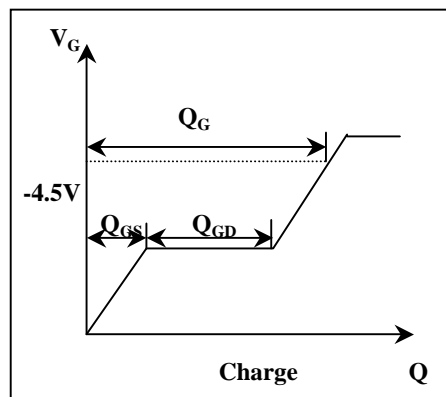
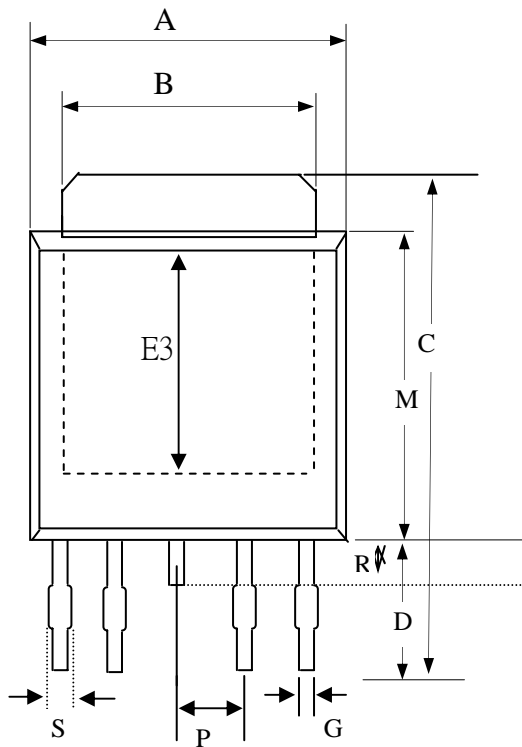


Fig 12. Gate Charge Waveform



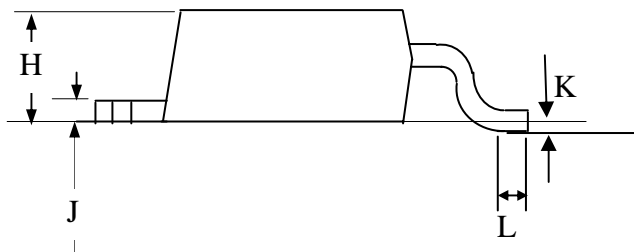
Package Outline : TO-252(4L)



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	6.40	6.6	6.80
B	5.2	5.35	5.50
C	9.40	9.80	10.20
D	2.40	2.70	3.00
P	1.27 REF.		
S	0.50	0.65	0.80
E3	3.50	4.00	4.50
R	0.80	1.00	1.20
G	0.40	0.50	0.60
H	2.20	2.30	2.40
J	0.45	0.50	0.55
K	0.00	0.075	0.15
L	0.90	1.20	1.50
M	5.40	5.60	5.80

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.



Part Marking Information & Packing : TO-252(4L)

