



Features

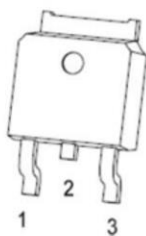
- $V_{DS} = -60V, I_D = -13A$
- $R_{DS(ON)} 100m\Omega @ V_{GS} = -10V (Typ)$
- $R_{DS(ON)} 110m\Omega @ V_{GS} = -4.5V (Typ)$

Application

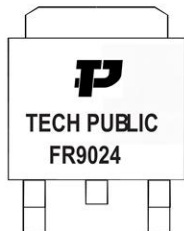
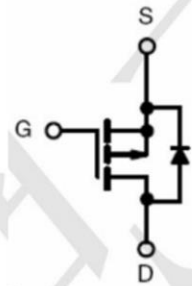
- Load/Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

Package and Pin Configuration

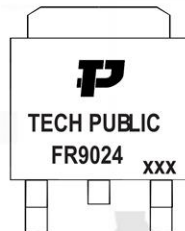
TO-252



1. GATE
2. DRAIN
3. SOURCE



Or



XXX is internal code

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-13	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	-8.5	A
Pulsed Drain Current	I_{DM}	-30	A
Maximum Power Dissipation	P_D	60	W
Derating factor		0.4	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	50	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	2.5	$^\circ C/W$
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Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-12A	-	100	110	mΩ
						Ω
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-12A	-	10	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, F=1.0MHz	-	1630.7	-	PF
Output Capacitance	C _{oss}		-	90.6	-	PF
Reverse Transfer Capacitance	C _{rss}		-	77.3	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, R _L =1.5Ω, V _{GS} =-10V, R _G =3Ω	-	11	-	nS
Turn-on Rise Time	t _r		-	14	-	nS
Turn-Off Delay Time	t _{d(off)}		-	33	-	nS
Turn-Off Fall Time	t _f		-	13	-	nS
Total Gate Charge	Q _g	V _{DS} =-30, I _D =-13A, V _{GS} =-10V	-	37.6		nC
Gate-Source Charge	Q _{gs}		-	4.3		nC
Gate-Drain Charge	Q _{gd}		-	7.2		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-12A	-		-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-12	A
Reverse Recovery Time	t _{rr}	T _J = 25 C, I _F = - 12A di/dt = -100A/μs (Note 3)	-	35		nS
Reverse Recovery Charge	Q _{rr}		-	38		nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



Typical Characteristics

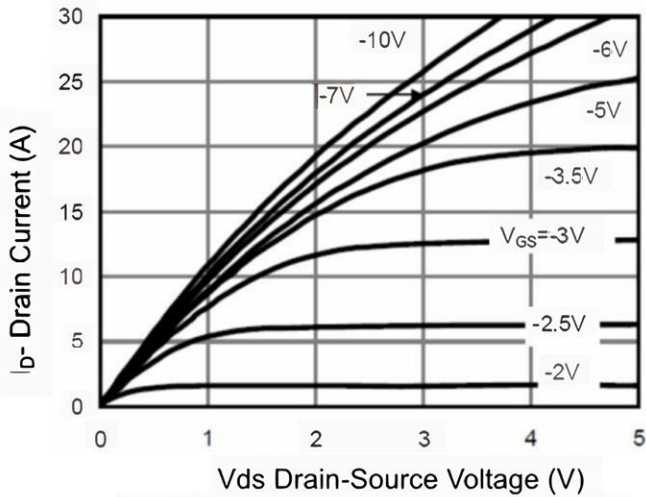


Figure 1 Output Characteristics

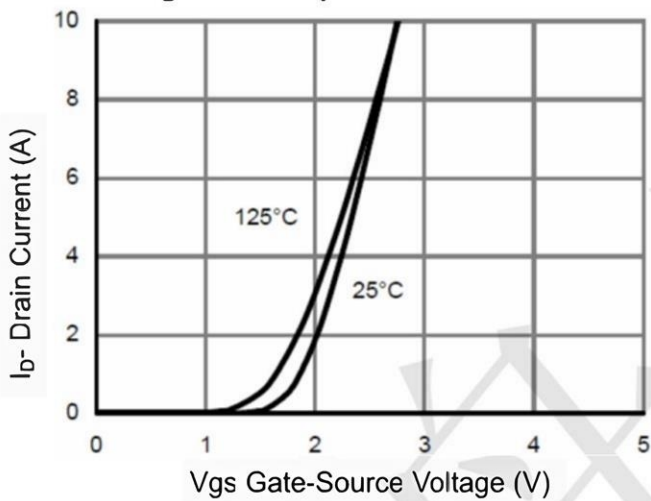


Figure 2 Transfer Characteristics

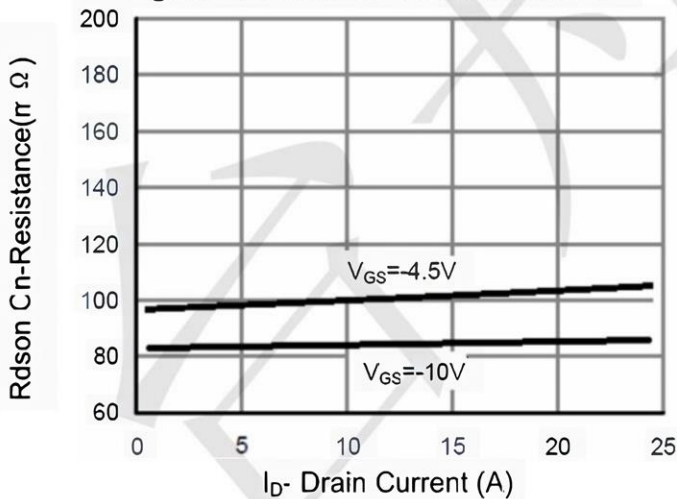


Figure 3 Rds(on) - Drain Current

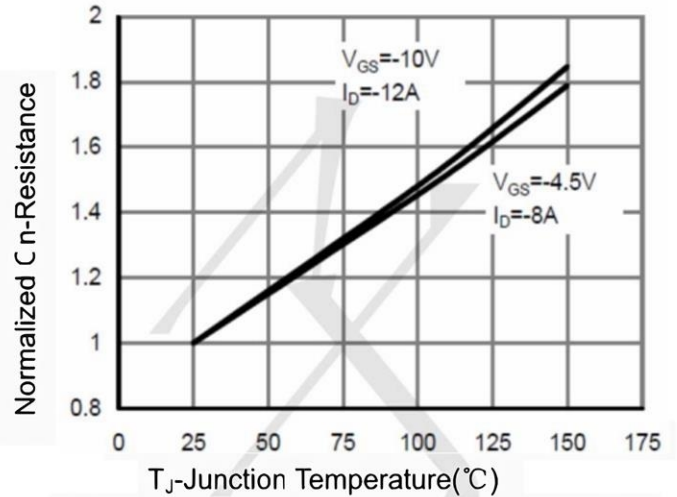


Figure 4 Rds(on) - Junction Temperature

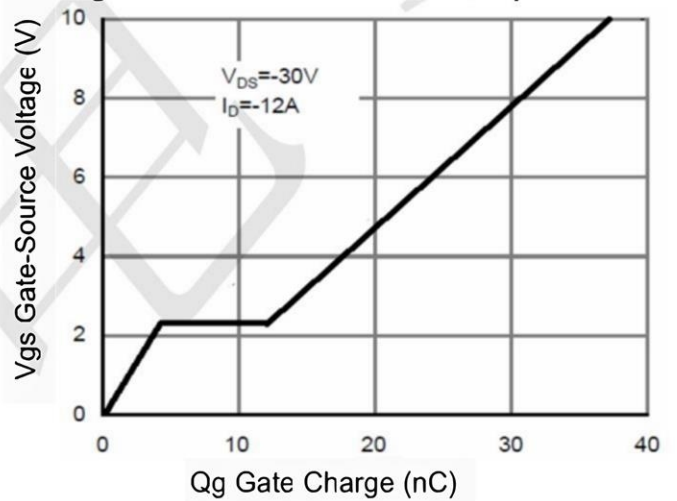


Figure 5 Gate Charge

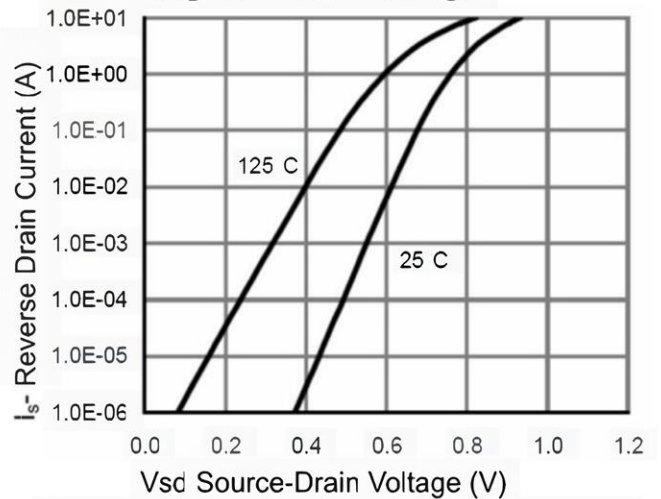


Figure 6 Source-Drain Diode Forward

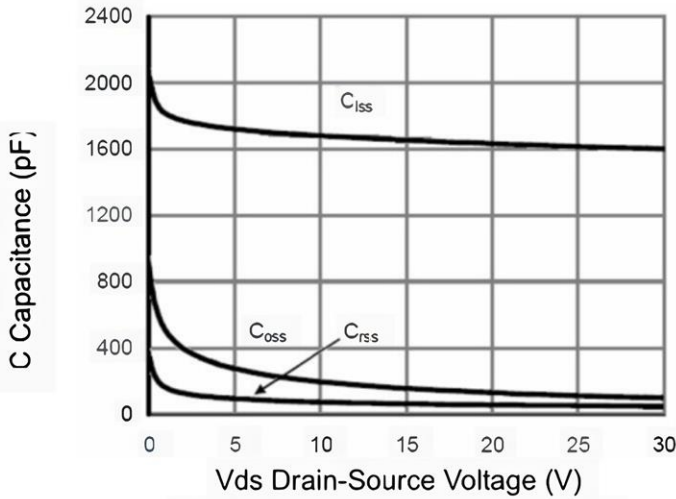


Figure 7 Capacitance vs Vds

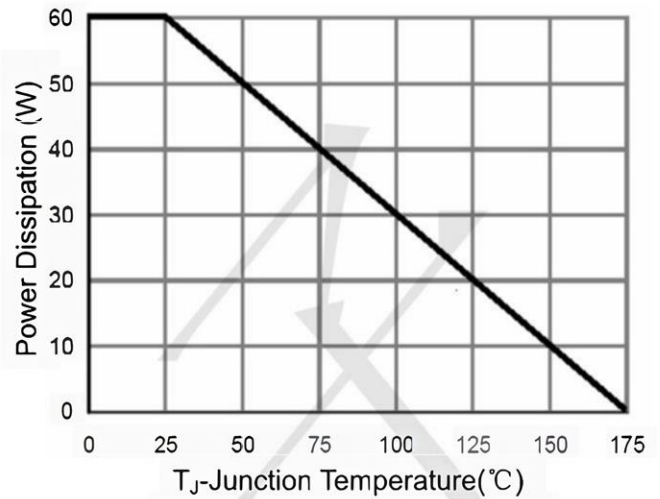


Figure 9 Power De-rating

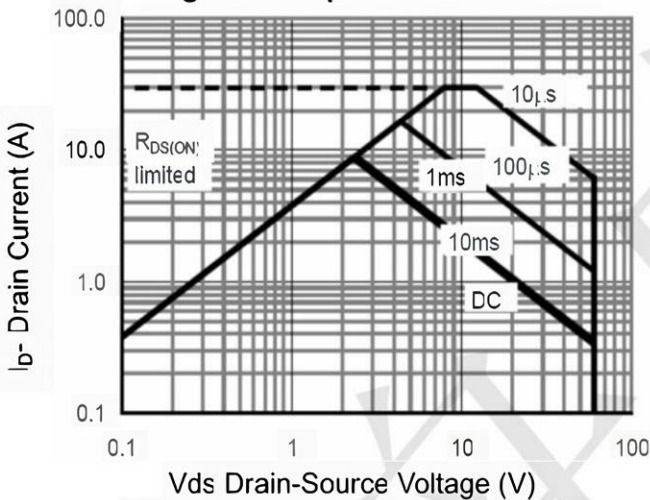


Figure 8 Safe Operation Area

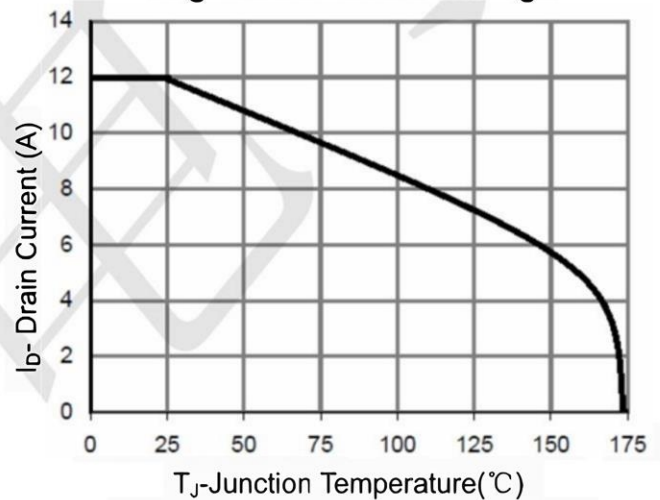


Figure 10 ID Current De-rating

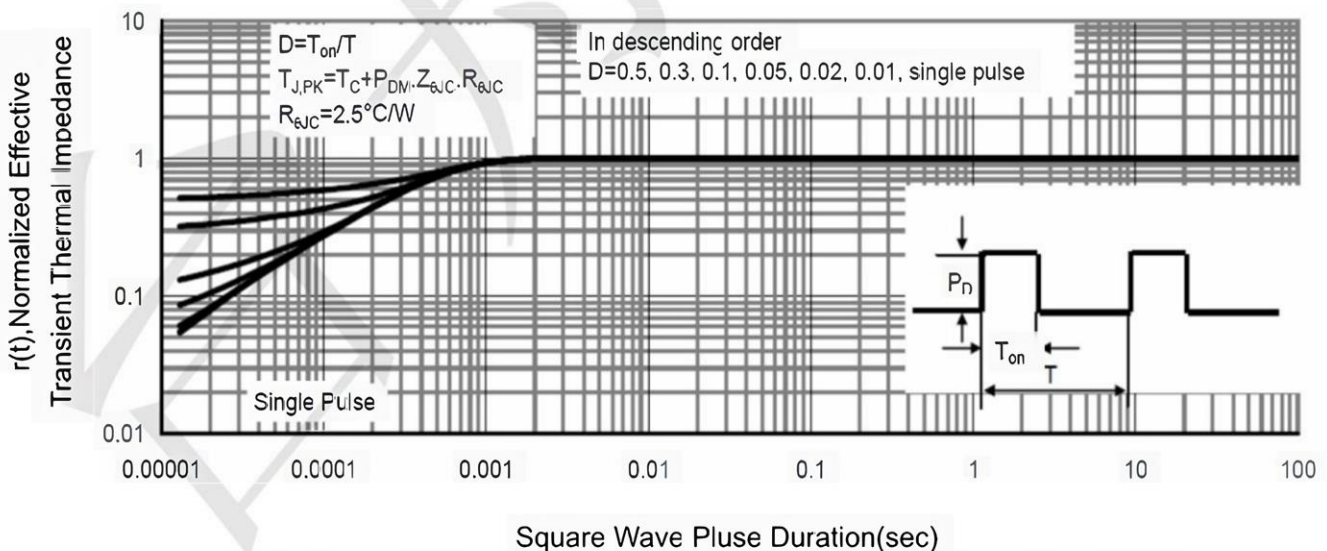
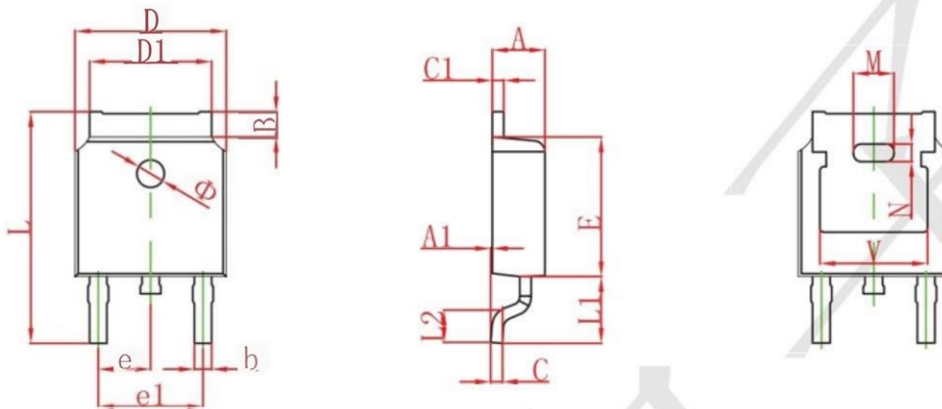


Figure 11 Normalized Maximum Transient Thermal Impedance



TO252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.380	0.087	0.094
A1	0.000	0.100	0.000	0.004
B	0.800	1.400	0.031	0.055
b	0.710	0.810	0.028	0.032
c	0.460	0.560	0.018	0.022
c1	0.460	0.560	0.018	0.022
D	6.500	6.700	0.256	0.264
D1	5.130	5.460	0.202	0.215
E	6.000	6.200	0.236	0.244
e	2.286 TYP.		0.090 TYP.	
e1	4.327	4.727	0.170	0.186
M	1.778REF.		0.070REF.	
N	0.762REF.		0.018REF.	
L	9.800	10.400	0.386	0.409
L1	2.9REF.		0.114REF.	
L2	1.400	1.700	0.055	0.067
V	4.830 REF.		0.190 REF.	
Φ	1.100	1.300	0.043	0.051