



-60V, -50A, 20mΩ Fast Switching MOSFETs

Features

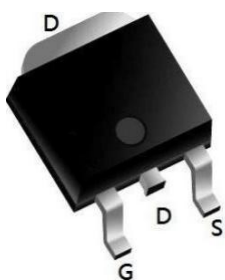
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low RDS(ON)

Applications

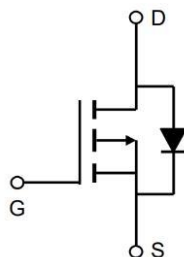
- DC-DC Converters
- Synchronous-rectification applications
- Power management

RoHS

TO252-3L



Equivalent Circuit



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_D@T_C=25^{\circ}\text{C}$	-50	A
	$I_D@T_C=100^{\circ}\text{C}$	-25	A
Pulsed Drain Current ¹	I_{DM}	-150	A
Single Pulse Avalanche Energy ²	EAS	200	mJ
Total Power Dissipation	P_D	95	W
Storage Temperature Range	T_{STG}	-55 to 150	$^{\circ}\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150	$^{\circ}\text{C}$
Maximum Temperature for Soldering	T_L	260	$^{\circ}\text{C}$
Thermal Resistance Junction-ambient	$R_{\theta JA}$	60	$^{\circ}\text{C/W}$
Thermal Resistance Junction-Case	$R_{\theta JC}$	1.32	$^{\circ}\text{C/W}$



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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Drain to Source Leakage Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$	-	-	1	μA
Gate to Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-10A$	-	20	25	m Ω
		$V_{GS}=-4.5V, I_D=-8A$	-	25	32	
Forward Transconductance	g_{fs}	$V_{DS}=-5V, I_D=-5A$	-	20	-	S
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=-30V,$ $f=1.0\text{MHz}$	-	1500	-	pF
Output Capacitance	C_{oss}		-	248	-	
Reverse Transfer Capacitance	C_{rss}		-	12	-	
Gate resistance	R_g	$V_{GS}=0V, V_{DS}$ Open	-	8	-	Ω
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-10A,$ $V_{GS}=-10V$	-	22	-	nC
Gate-Source Charge	Q_{gs}		-	3.7	-	
Gate-Drain("Miller")Charge	Q_{gd}		-	3	-	
Turn-on Delay Time	$T_{d(on)}$	$V_{GS}=-10V, I_D=-10A,$ $R_G=3\Omega, V_{DS}=-30V,$ $R_L=3\Omega$	-	15	-	nS
Turn-on Rise Time	t_r		-	17	-	
Turn-Off Delay Time	$T_{d(off)}$		-	40	-	
Turn-Off Fall Time	T_f		-	45	-	
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-5A$	-	-	-1.2	V
Reverse Recovery time	t_{rr}	$I_S=-10A, V_{DD}=-30V$ $di/dt=100A/\mu s$	-	60	-	ns
Reverse Recovery Charge	Q_{rr}		-	105	-	nC
Diode Forward Current	I_S	$T_C=25^{\circ}\text{C}$	-	-	-50	A
Diode Pulse Current	I_{SM}		-	-	-150	A

Note :

1.Repetitive rating; pulse width limited by maximum junction temperature

2. $V_{DD}=-60V$, $L=0.3\text{mH}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$



Typical Performance Characteristics

Fig1:Typ. output characteristics

$$I_D = f(-V_{DS})$$

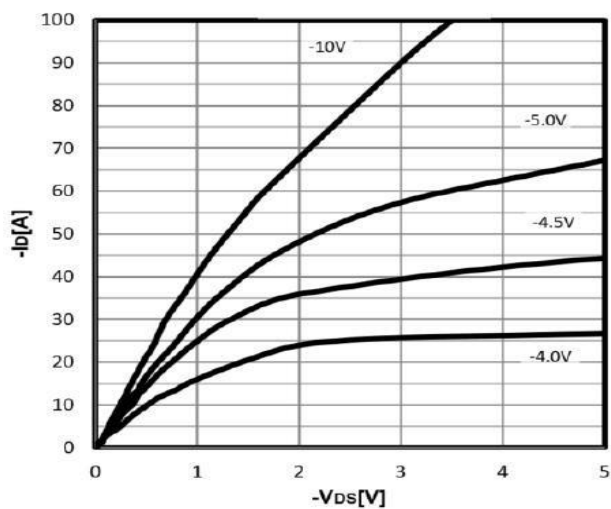


Fig2:Typ. drain-source on resistance

$$R_{DS(on)} = f(-I_D)$$

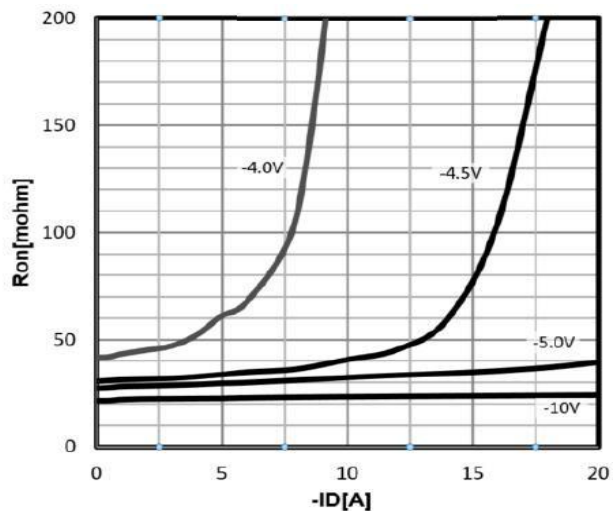


Fig3:Typ. transfer characteristics

$$-I_D = f(-V_{GS})$$

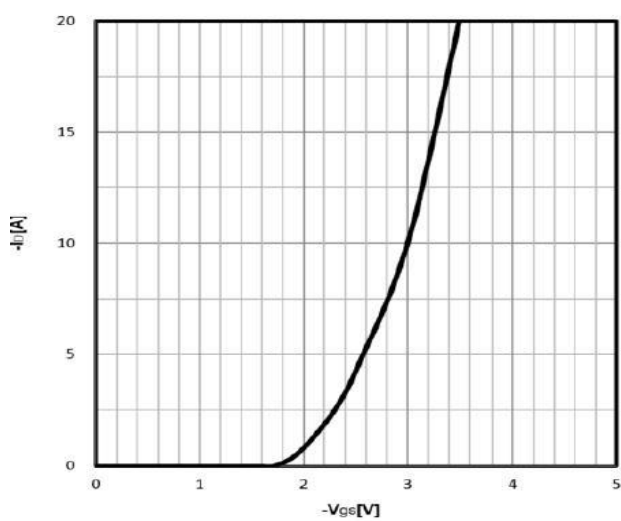


Fig4:Typ. drain-source on resistance

$$R_{DS(on)} = f(T_j); I_D = -10A; V_{GS} = -10V$$

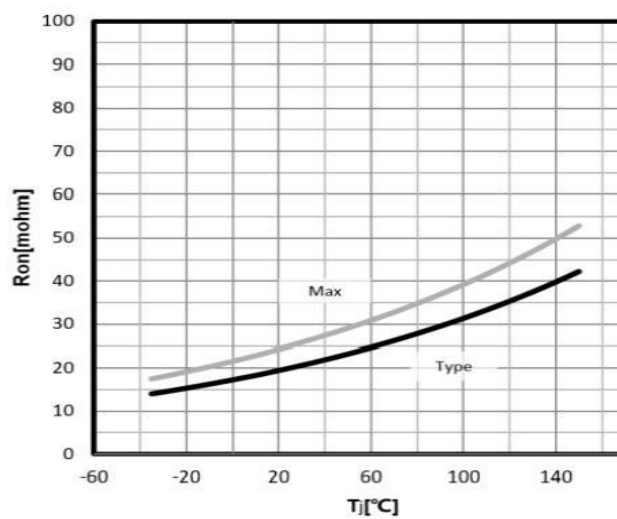




Fig5:Typ. gate threshold voltage

$V_{GS}=f(T_J)$, $V_{GS}=V_{DS}$, $I_D=-250\ \mu A$;

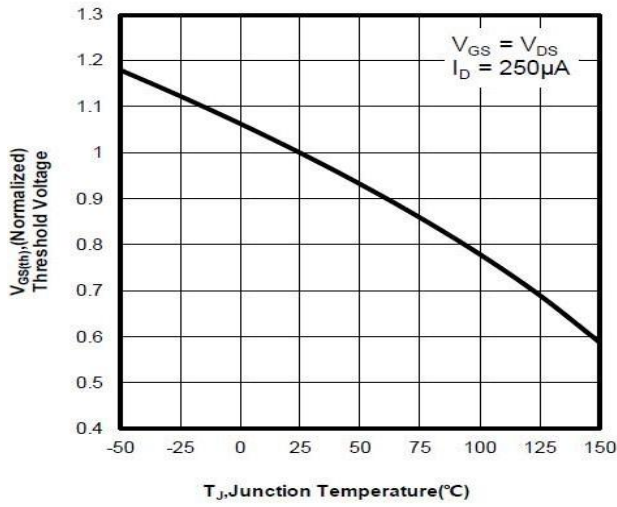


Fig6:Drain-source breakdown voltage

$V_{BR(DSS)}=f(T_J)$; $I_D=-250\ \mu A$;

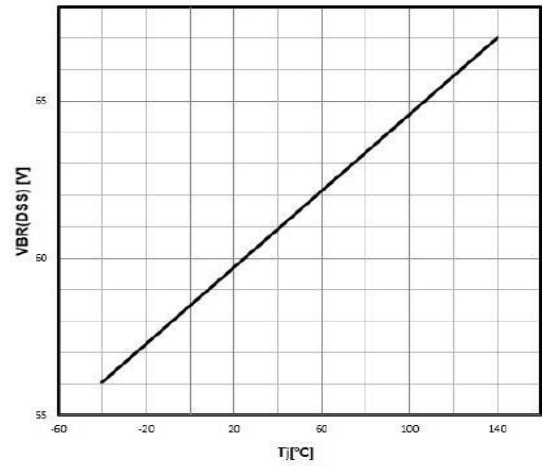


Fig7:Typ. gate charge

$V_{GS}=f(Q_g)$, $I_D=-5A$, $T_J=25^\circ C$;

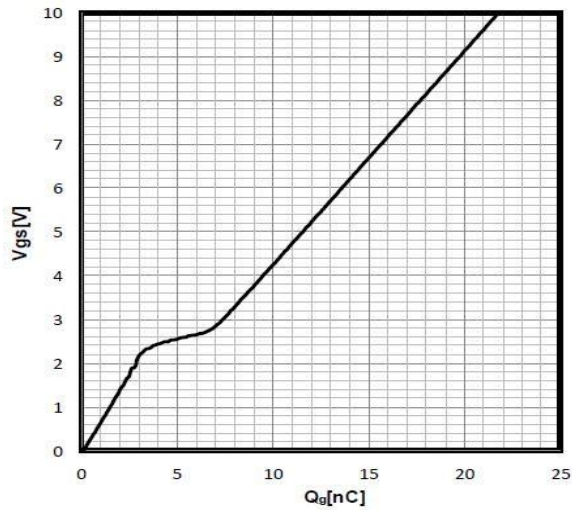


Fig8:Typ. Capacitances

$C=f(V_{DS})$; $V_{GS}=0V$; $f=1.0\ MHz$;

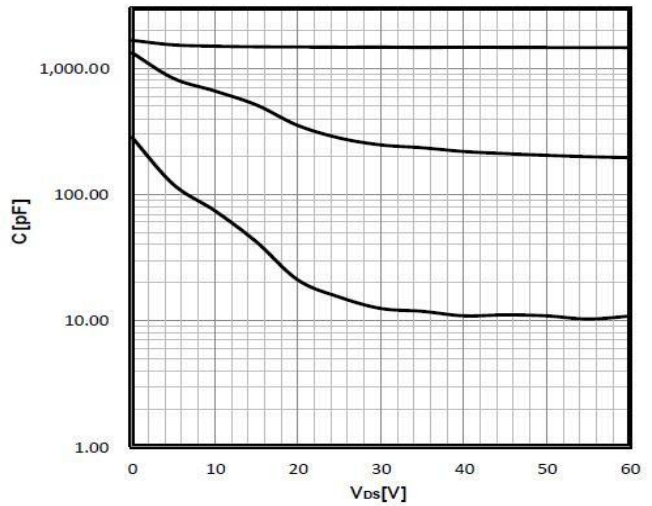


Fig9:Power Dissipation

$P_{tot}=f(T_C)$

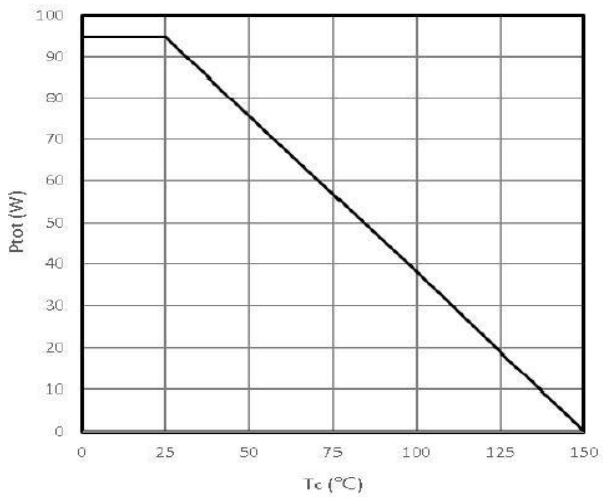


Fig10:Drain current

$I_D=f(T_C)$

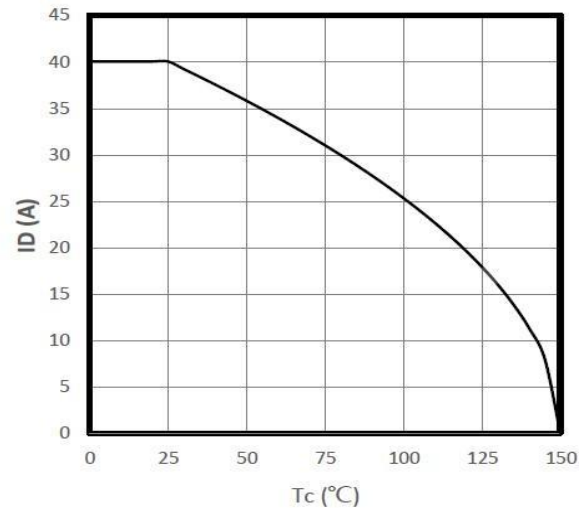




Fig11: Safe operating area

$$I_D = f(V_{DS}); T_C = 25^\circ\text{C}$$

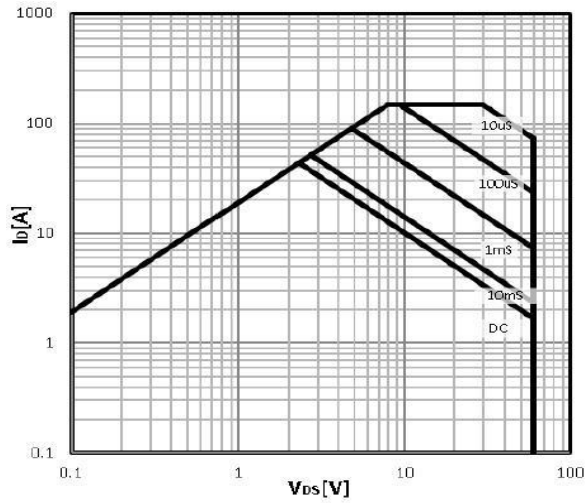


Fig12: Typ. forward characteristics

$$I_F = f(V_{SD});$$

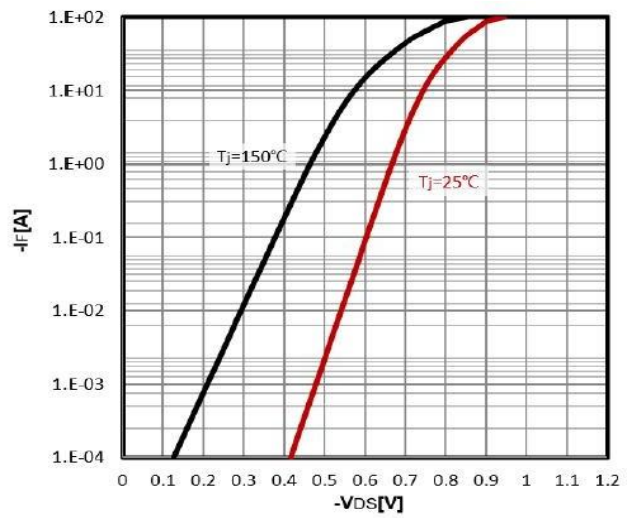
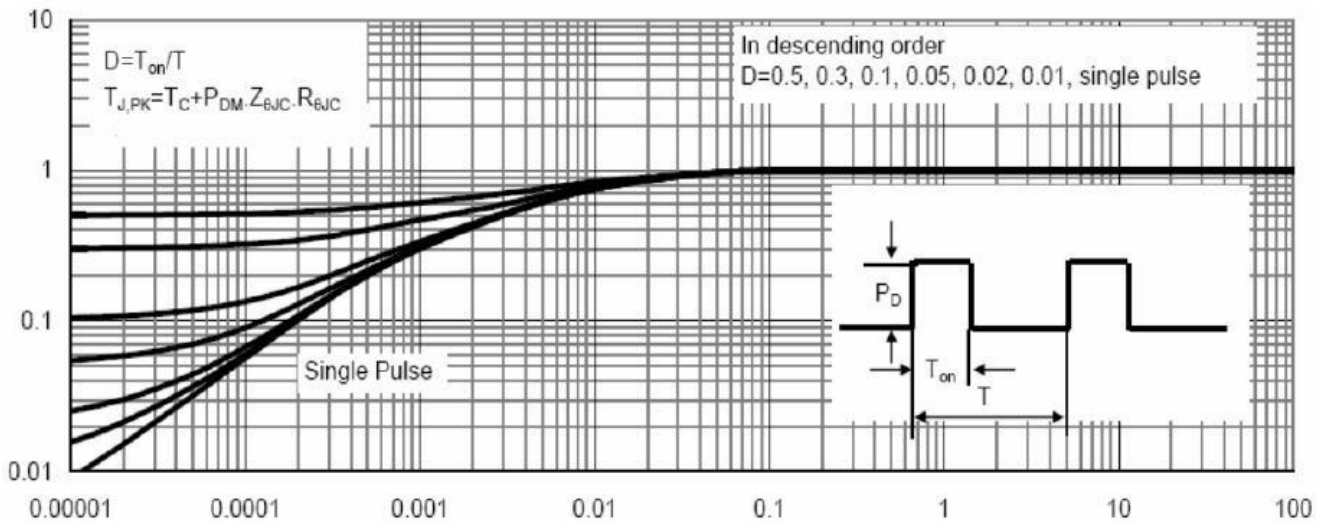


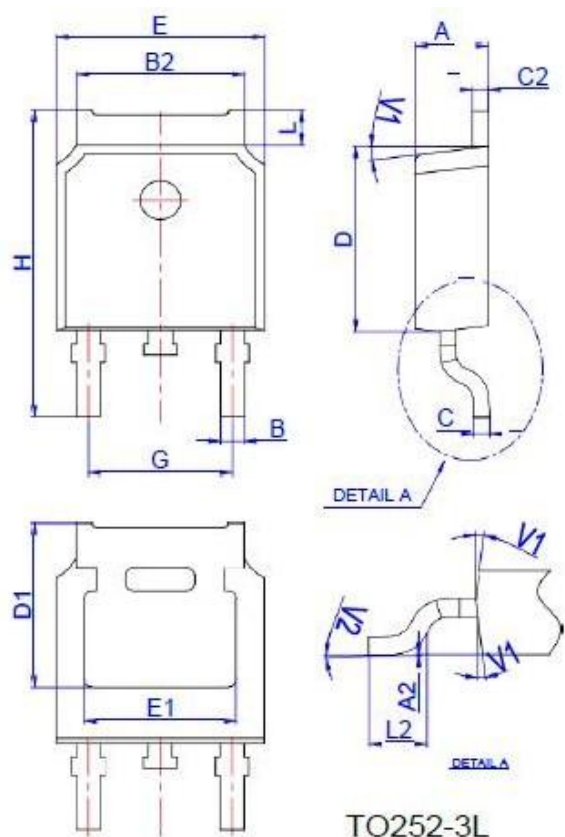
Figure 13: Max. Transient Thermal Impedance

$$Z_{thJC} = f(t_p); \text{ parameter: D}$$

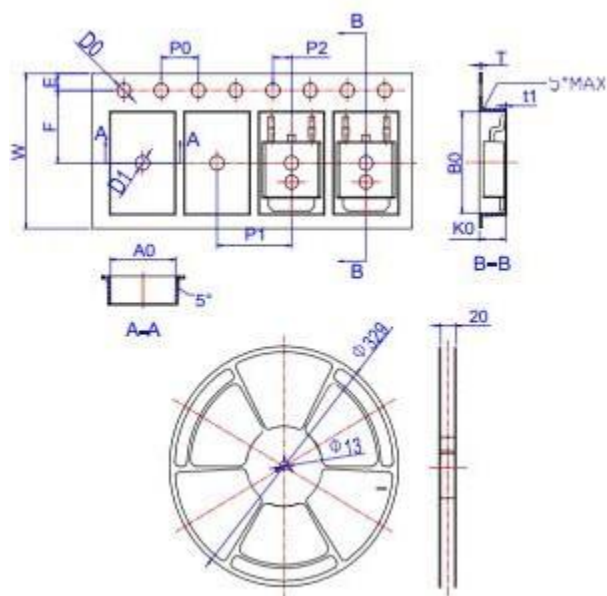




Package Dimensions TO252-3L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583