
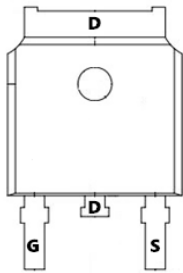


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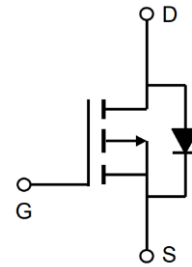
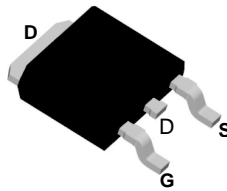
P -Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS} = -40V$ $I_D = -20A$</p> <p>$R_{DS(ON)} = 36m\Omega$ (typ.) @ $V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
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Marking: 20P04

D:TO-252-3L



Absolute Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C=25^\circ C$	-20	A
I_{DM}	Pulsed Drain Current ¹	-80	A
P_D	Total Power Dissipation	34	W
E_{AS}	Single Pulsed Avalanche Energy ²	40.6	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.67	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\ \mu A$	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-40V$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\ \mu A$	-1	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ³	$V_{GS}=-10V, I_D=-8A$	---	36	50	m Ω
		$V_{GS}=-4.5V, I_D=-5A$	---	49	60	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1MHz$	---	1033	---	pF
C_{oss}	Output Capacitance		---	106	---	
C_{rss}	Reverse Transfer Capacitance		---	79	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-20V, I_D=-5A,$ $V_{GS}=-10V, R_G=2.5\ \Omega$	---	7	---	ns
t_r	Rise Time		---	14	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	22	---	ns
t_f	Fall Time		---	8	---	ns
Q_g	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-20V,$ $I_D=-5A$	---	19	---	nC
Q_{gs}	Gate-Source Charge		---	3.4	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	4.1	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Drain Diode Forward Voltage ²	$V_{GS}=0V, I_S=-10A$	---	-0.8	-1.2	V
I_S	Continuous Source Current	$V_G=V_D=0V$	---	---	-20	A
I_{sm}	Pulsed Drain Current	$V_G=V_D=0V$	---	---	-80	A
Q_{rr}	Reverse Recovery Charge	$V_{GS}=0V, I_S=-5A,$	---	20	---	nC
t_{rr}	Reverse Recovery Time	$di/dt=100A/\mu s$	---	29	---	ns

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-20V$, $V_G=-10V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=-10.5A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Characteristics

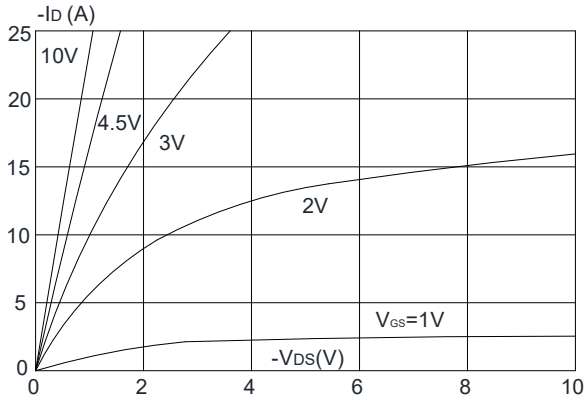


Figure 1: Output Characteristics

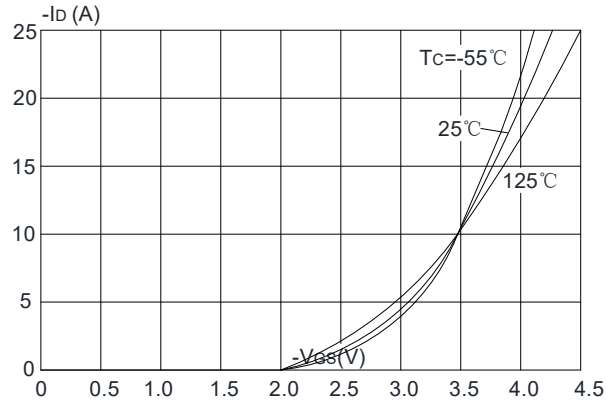


Figure 2: Typical Transfer Characteristics

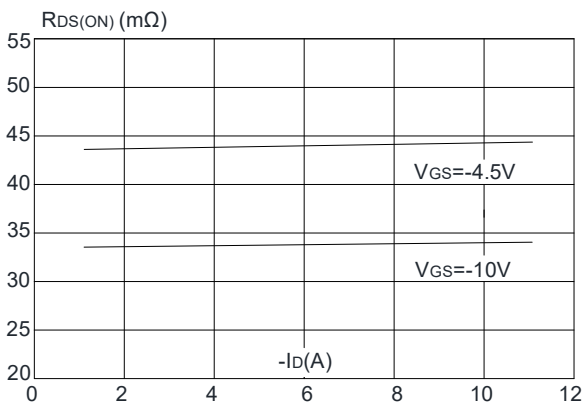


Figure 3: On-resistance vs. Drain Current

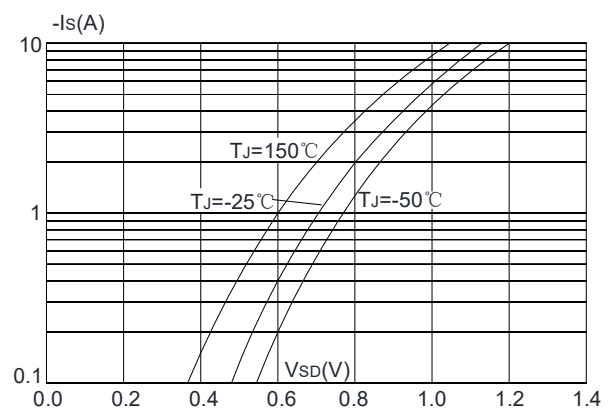


Figure 4: Body Diode Characteristics

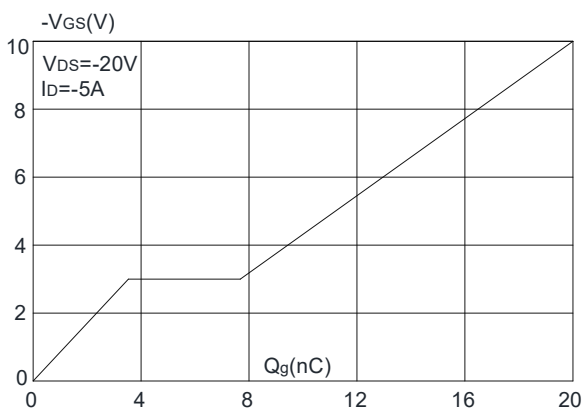


Figure 5: Gate Charge Characteristics

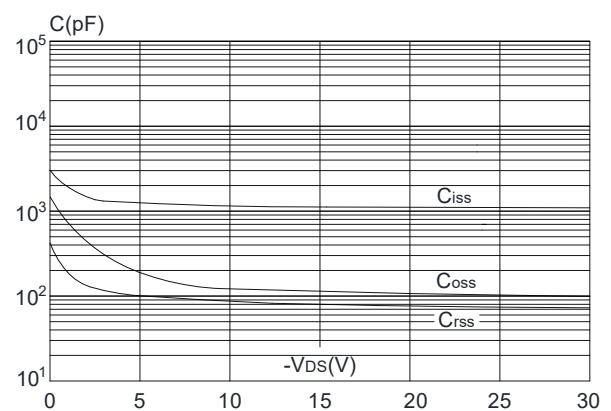


Figure 6: Capacitance Characteristics

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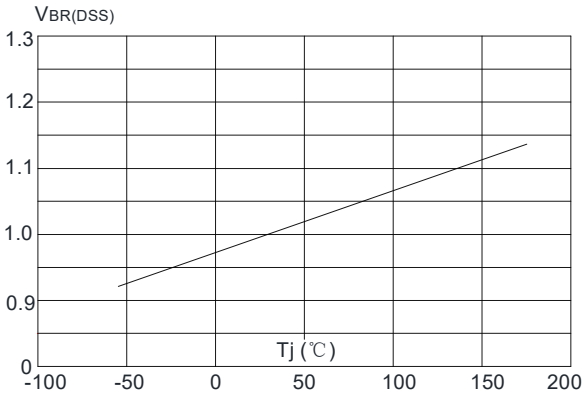


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

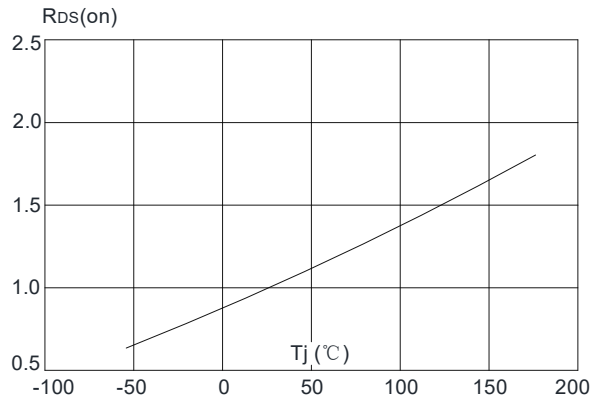


Figure 8: Normalized on Resistance vs. Junction Temperature

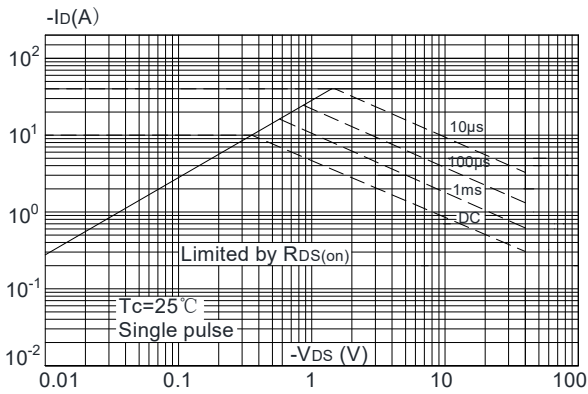


Figure 9: Maximum Safe Operating Area

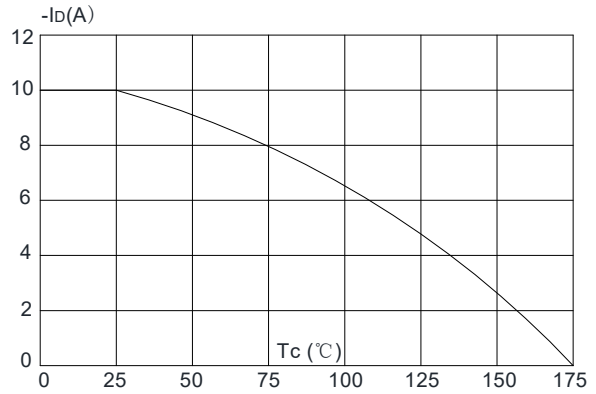


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

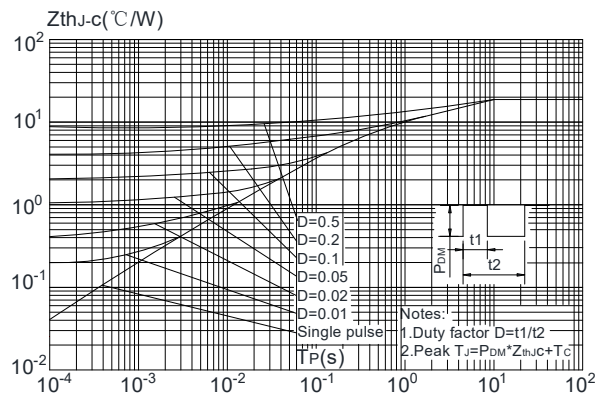
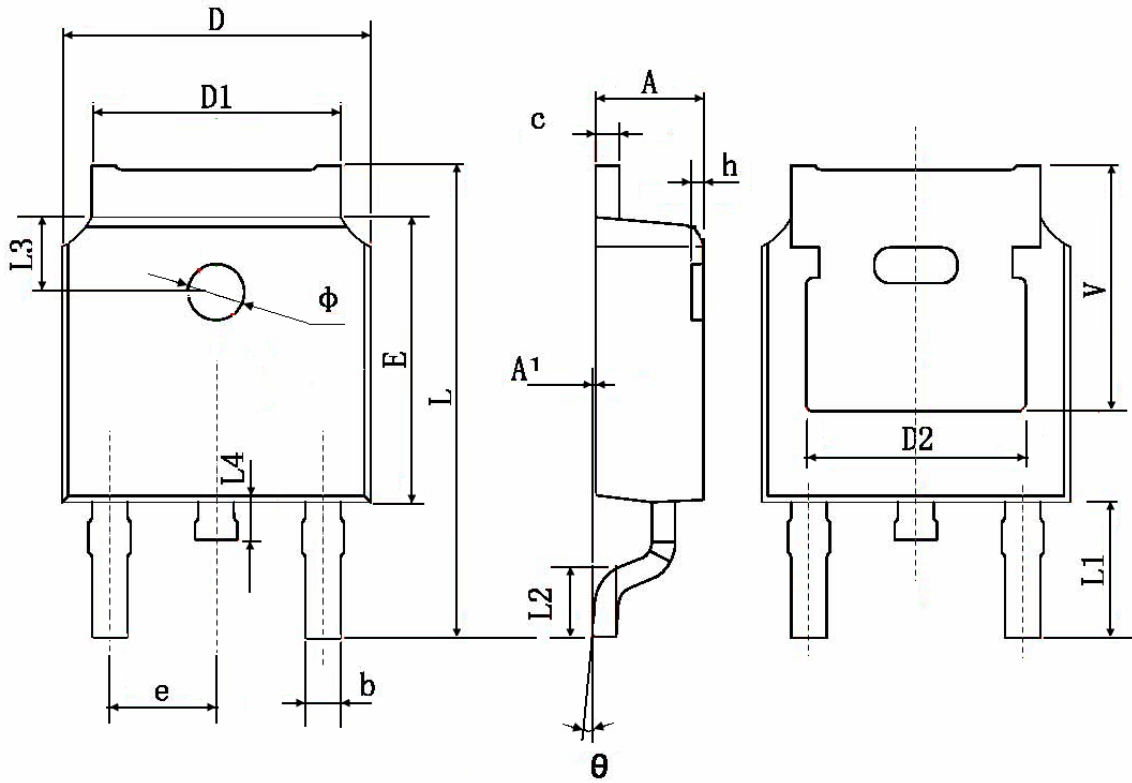


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Information:TO-252-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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