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DMG4511SK4-13

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Lead-free Green

DMG4511SK4

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = 25°C$
35V	35mΩ @ V_{GS} = 10V	13A
-35V	45mΩ @ V_{GS} = -10V	-12A

Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

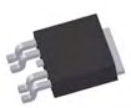
- Backlighting
- DC-DC Converters
- Power management functions

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

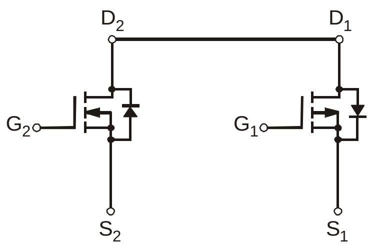
Mechanical Data

- Case: TO252-4L
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.328 grams (approximate)



Top View

Bottom View



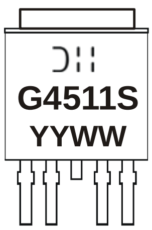
N-Channel MOSFET P-Channel MOSFET

Ordering Information (Note 3)

Part Number	Case	Packaging
DMG4511SK4-7	TO252-4L	3000 / Tape & Reel

Notes: 1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



Ↄ¦¦ = Manufacturer's Marking
G4511S = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 09 = 2009)
WW = Week (01 – 53)

Maximum Ratings – N-CHANNEL, Q1 @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	35	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 4) V_{GS} = 10V	Steady State	T_A = 25°C T_A = 70°C	I_D	5.3 4.2	A
Continuous Drain Current (Note 5) V_{GS} = 10V	Steady State	T_A = 25°C T_A = 70°C	I_D	8.6 6.8	A
Continuous Drain Current (Note 5) V_{GS} = 10V	t ≤ 10s	T_A = 25°C T_A = 70°C	I_D	13 11	A
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	6.3 5.0	A
Continuous Drain Current (Note 5) V_{GS} = 4.5V	t ≤ 10s	T_A = 25°C T_A = 70°C	I_D	9.3 7.4	A
Pulsed Drain Current (Note 6)			I_{DM}	50	A

Maximum Ratings – P-CHANNEL, Q2 @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-35	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 4) V_{GS} = -10V	Steady State	T_A = 25°C T_A = 70°C	I_D	-5.0 -3.8	A
Continuous Drain Current (Note 5) V_{GS} = -10V	Steady State	T_A = 25°C T_A = 70°C	I_D	-7.8 -6.2	A
Continuous Drain Current (Note 5) V_{GS} = -10V	t ≤ 10s	T_A = 25°C T_A = 70°C	I_D	-12 -10	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	-6.5 -5.2	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	t ≤ 10s	T_A = 25°C T_A = 70°C	I_D	-9.6 -7.7	A
Pulsed Drain Current (Note 6)			I_{DM}	-50	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	P_D	1.54	W
Thermal Resistance, Junction to Ambient @T_A = 25°C (Note 4)	$R_{\theta JA}$	81.3	°C/W
Power Dissipation (Note 5)	P_D	4.1	W
Thermal Resistance, Junction to Ambient @T_A = 25°C (Note 5)	$R_{\theta JA}$	30.8	°C/W
Power Dissipation (Note 5) t ≤ 10s	P_D	8.9	W
Thermal Resistance, Junction to Ambient @T_A = 25°C (Note 5) t ≤ 10s	$R_{\theta JA}$	14	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
4. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
5. Device mounted on 2" x 2" FR-4 PCB with high coverage 2 oz. Copper, single sided.
6. Repetitive rating, pulse width limited by junction temperature.

Electrical Characteristics – N-CHANNEL, Q1 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	35	-	-	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	-	-	1.0	μA	V_{DS} = 35V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	-	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	25 50	35 65	mΩ	V_{GS} = 10V, I_D = 8A V_{GS} = 4.5V, I_D = 6A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	4.5	-	S	V_{DS} = 10V, I_D = 8A
Diode Forward Voltage	V_{SD}	-	-	1.2	V	V_{GS} = 0V, I_S = 8A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	850	-	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	64.7	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	51.9	-	pF	
Gate Resistance	R_g	-	1.6	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	-	18.7	-	nC	V_{GS} = 10V, V_{DS} = 28V, I_D = 8A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	-	8.8	-		V_{GS} = 4.5V, V_{DS} = 28V, I_D = 8A
Gate-Source Charge	Q_{gs}	-	2.6	-		
Gate-Drain Charge	Q_{gd}	-	2.1	-		
Turn-On Delay Time	$t_{D(on)}$	-	5.4	-	ns	V_{DS} = 18V, V_{GS} = 10V, R_L = 18Ω, R_G = 3.3Ω, I_D = 1A
Turn-On Rise Time	t_r	-	2.8	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	33.2	-	ns	
Turn-Off Fall Time	t_f	-	35.6	-	ns	

Electrical Characteristics – P-CHANNEL, Q2 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-35	-	-	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	-	-	-1.0	μA	V_{DS} = -35V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	-	-3.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	30 40	45 65	mΩ	V_{GS} = -10V, I_D = -6A V_{GS} = -4.5V, I_D = -4A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	8	-	S	V_{DS} = -10V, I_D = -6A
Diode Forward Voltage	V_{SD}		-	-1.2	V	V_{GS} = 0V, I_S = -6A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	985.2	-	pF	V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	90.6	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	75.3	-	pF	
Gate Resistance	R_g	-	7.0	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -10V)	Q_g	-	19.2	-	nC	V_{GS} = -10V, V_{DS} = -28V, I_D = -6A
Total Gate Charge (V_{GS} = -4.5V)	Q_g	-	9.5	-		V_{GS} = -4.5V, V_{DS} = -28V, I_D = -6A
Gate-Source Charge	Q_{gs}	-	2.0	-		
Gate-Drain Charge	Q_{gd}	-	3.5	-		
Turn-On Delay Time	$t_{D(on)}$	-	5.2	-	ns	V_{DS} = -18V, V_{GS} = -10V, R_L = 18Ω, R_G = 3.3Ω, I_D = -1A
Turn-On Rise Time	t_r	-	4.8	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	45.8	-	ns	
Turn-Off Fall Time	t_f	-	29.5	-	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

N-CHANNEL, Q1

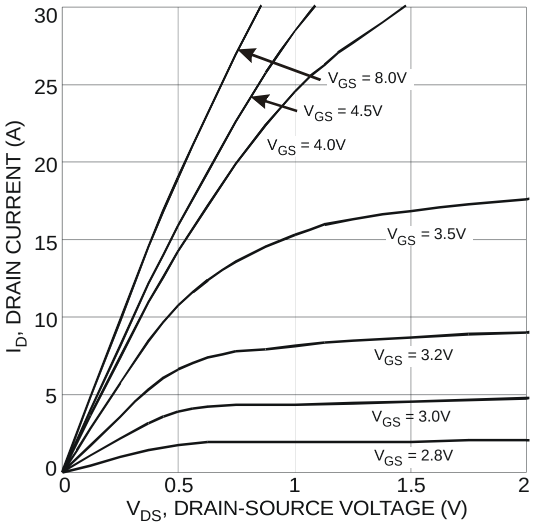


Fig. 1 Typical Output Characteristic

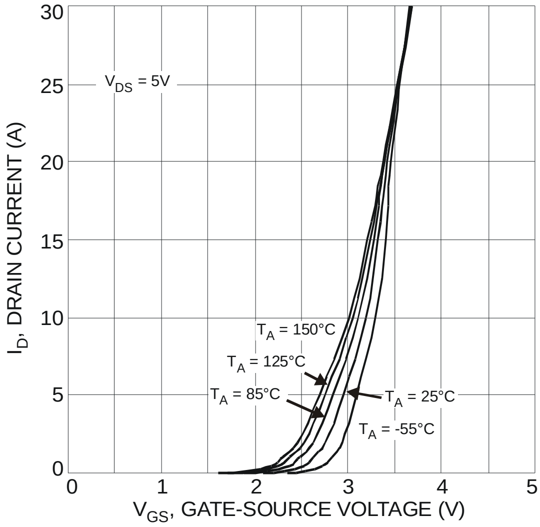


Fig. 2 Typical Transfer Characteristic

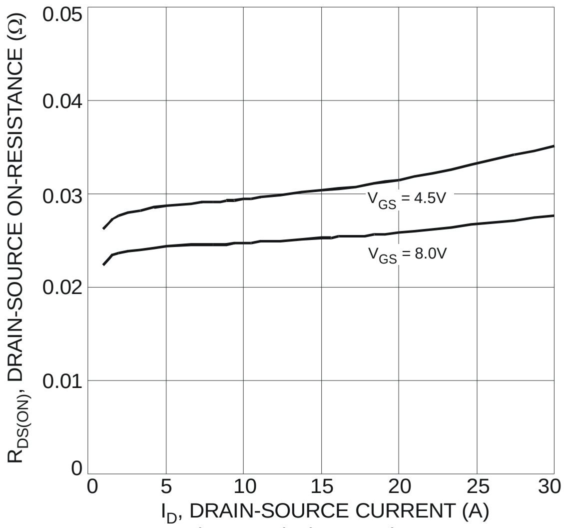


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

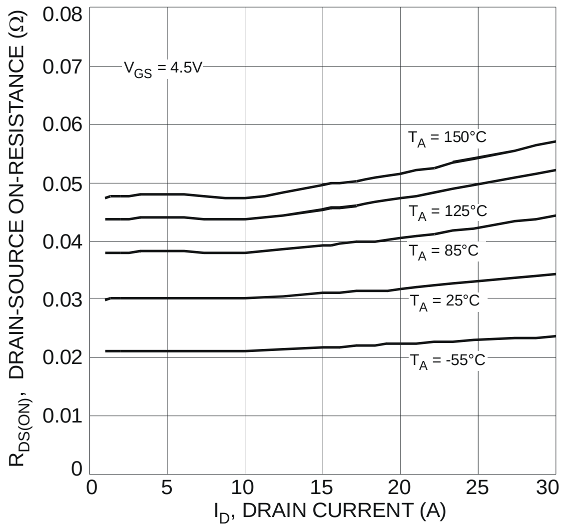


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

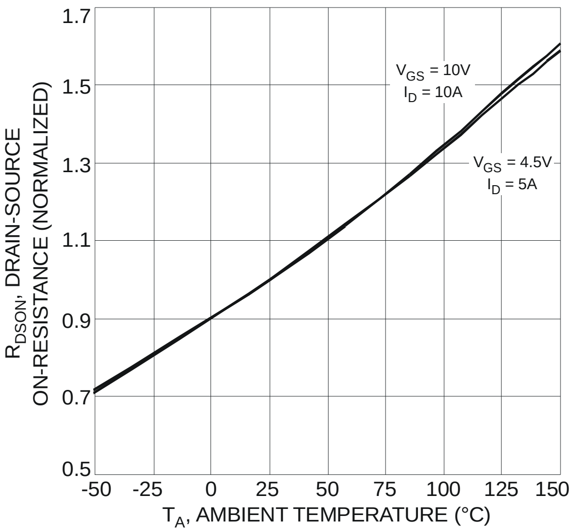


Fig. 5 On-Resistance Variation with Temperature

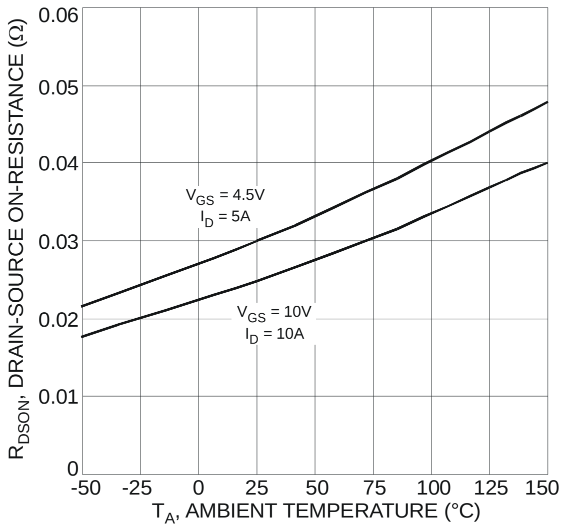


Fig. 6 On-Resistance Variation with Temperature

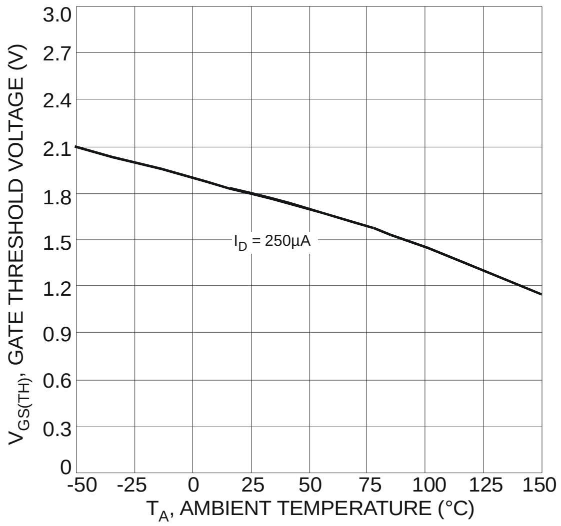


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

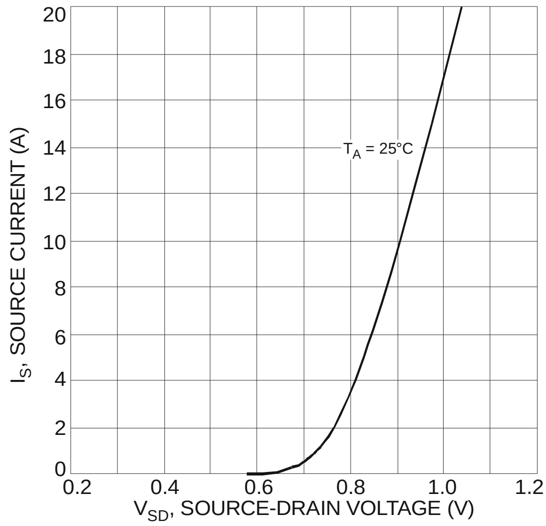


Fig. 8 Diode Forward Voltage vs. Current

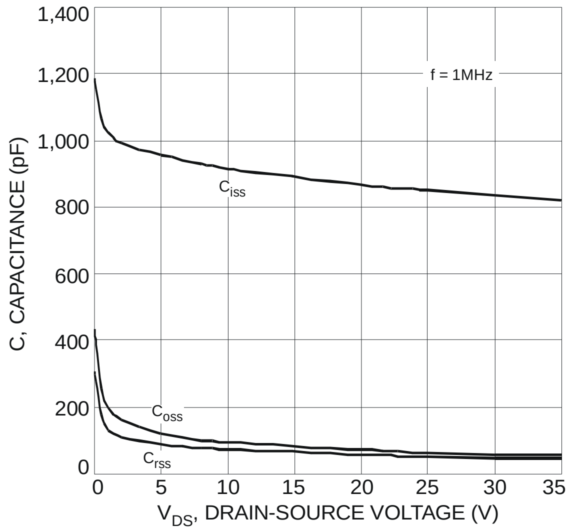


Fig. 9 Typical Total Capacitance

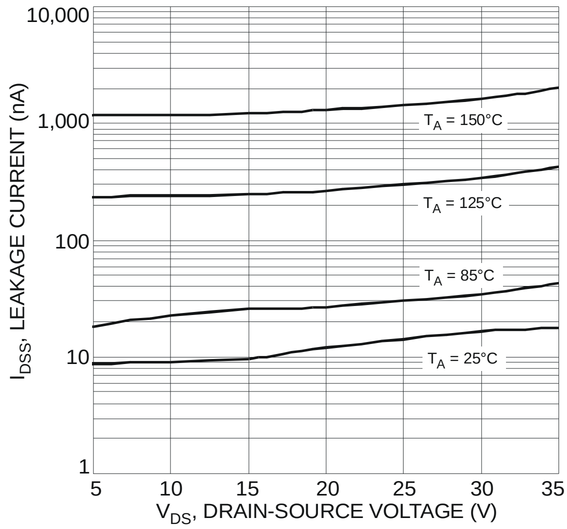


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

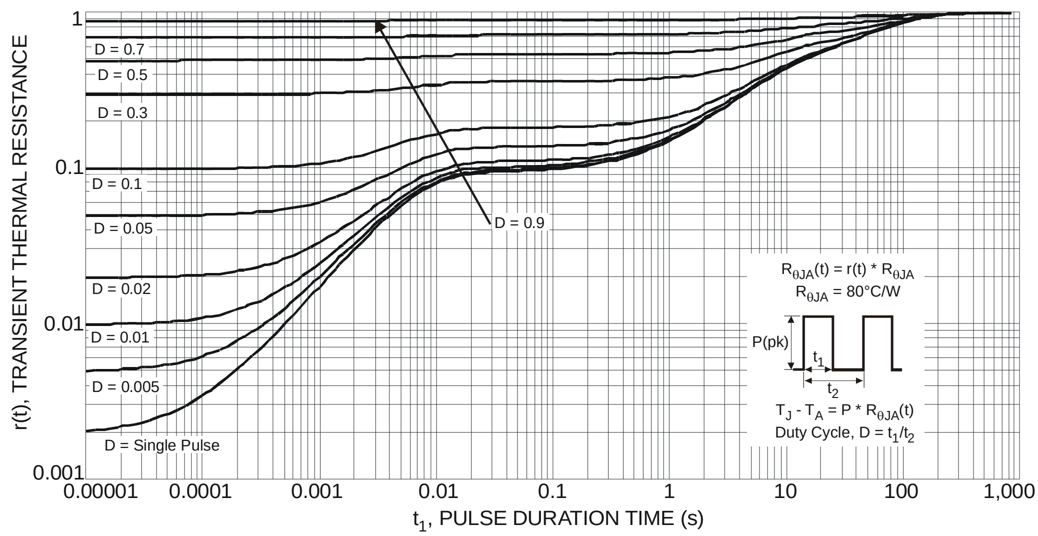


Fig. 11 Transient Thermal Response

P-CHANNEL, Q2

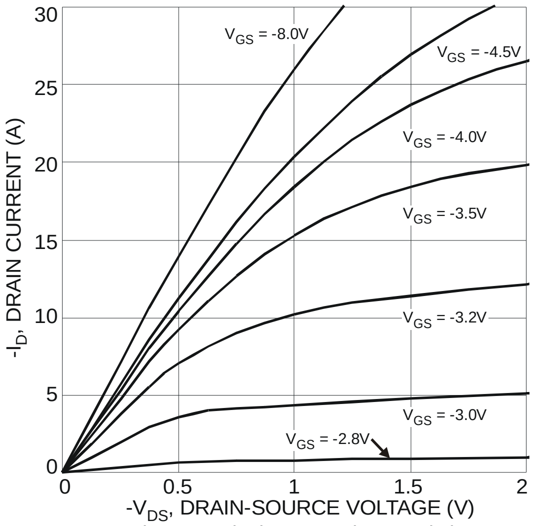


Fig. 12 Typical Output Characteristic

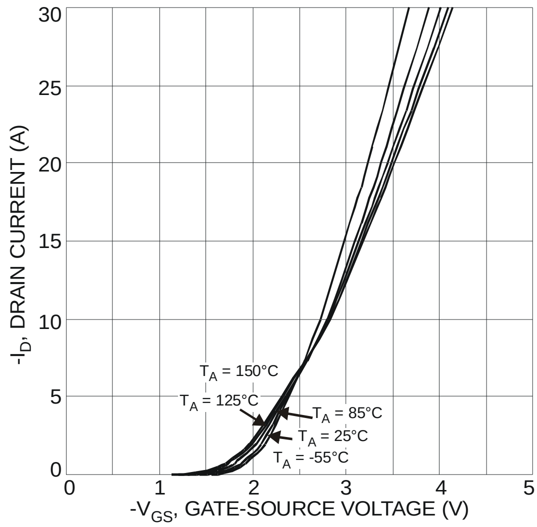


Fig. 13 Typical Transfer Characteristic

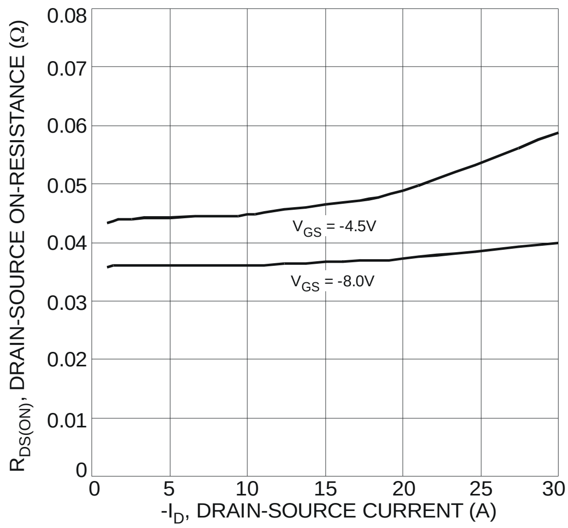


Fig. 14 Typical On-Resistance vs. Drain Current and Gate Voltage

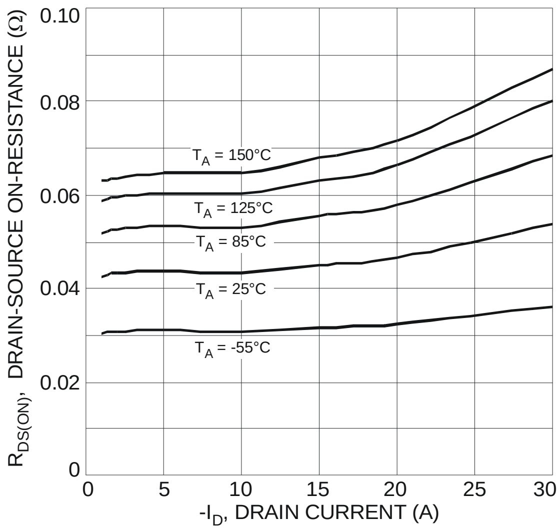


Fig. 15 Typical On-Resistance vs. Drain Current and Temperature

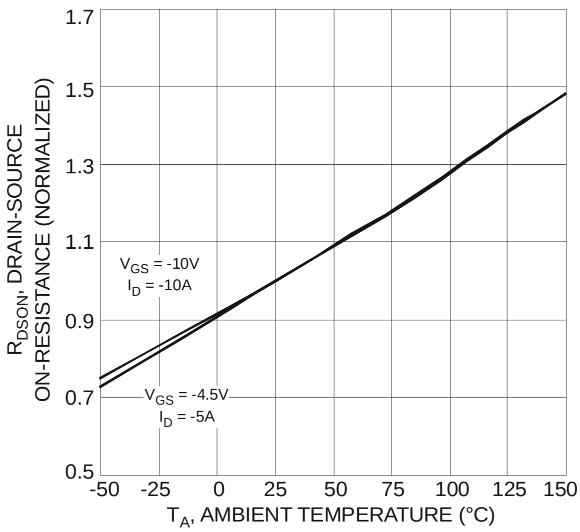


Fig. 16 On-Resistance Variation with Temperature

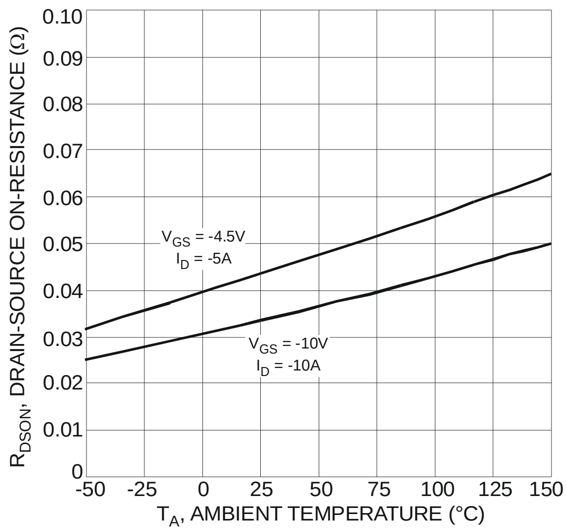


Fig. 17 On-Resistance Variation with Temperature

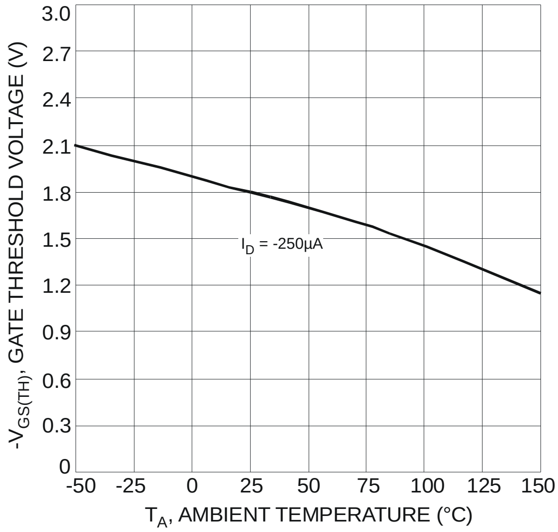


Fig. 18 Gate Threshold Variation vs. Ambient Temperature

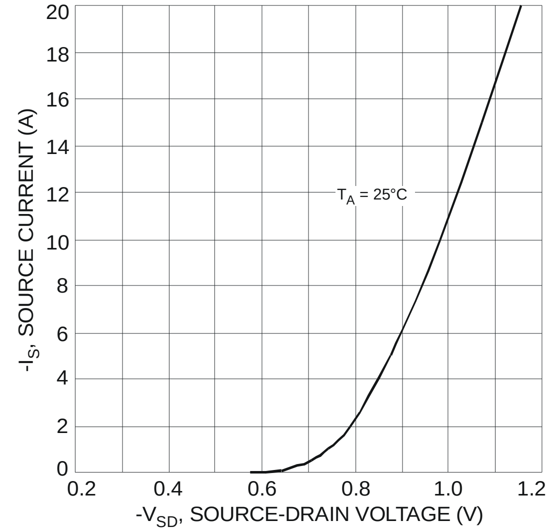


Fig. 19 Diode Forward Voltage vs. Current

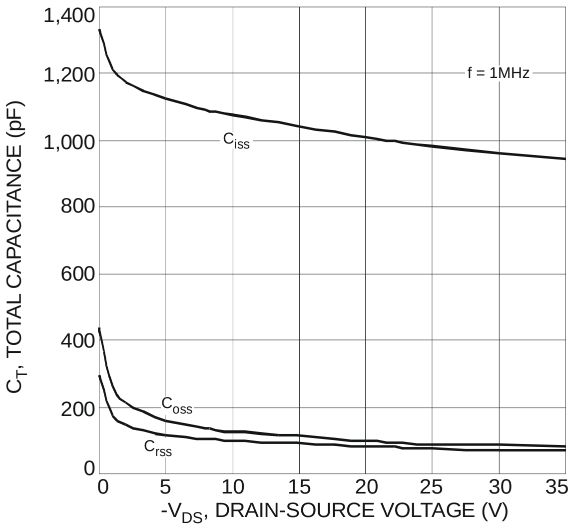


Fig. 20 Typical Total Capacitance

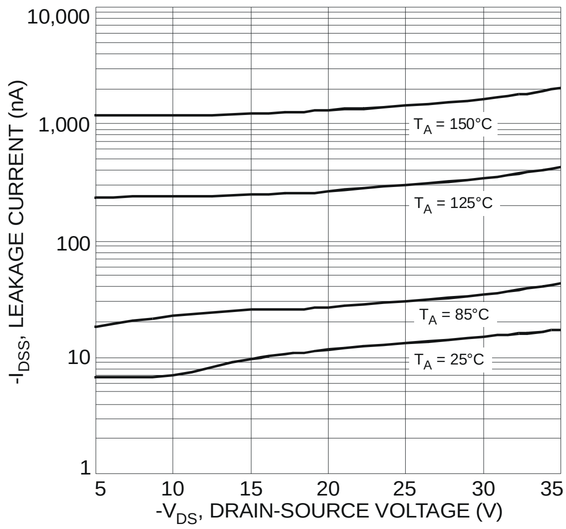


Fig. 21 Typical Leakage Current vs. Drain-Source Voltage

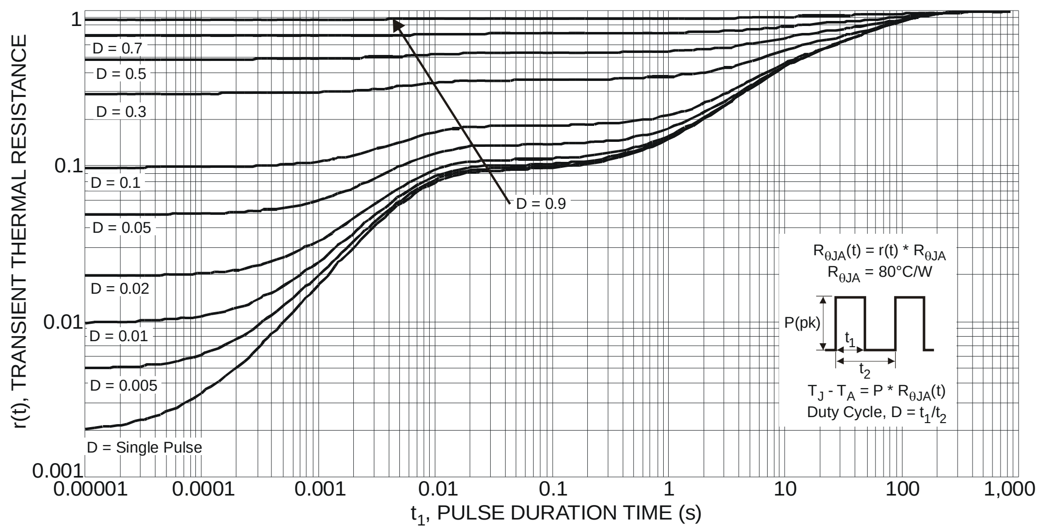
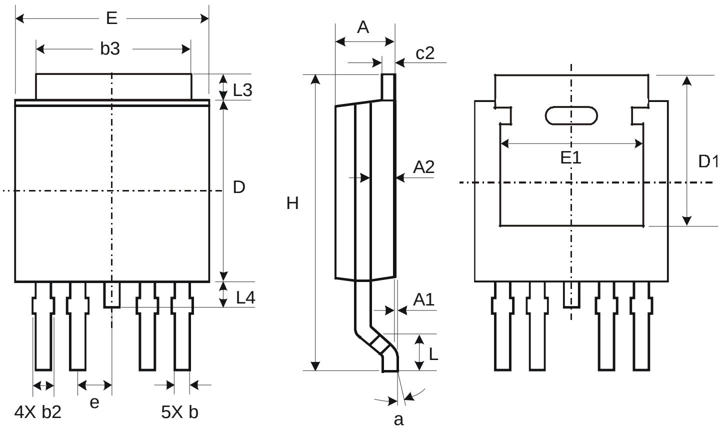


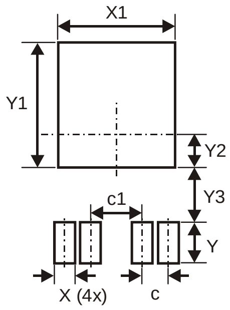
Fig. 22 Transient Thermal Response

Package Outline Dimensions



TO252-4L			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.51	0.71	0.583
b2	0.61	0.79	0.70
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	1.27
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
c	1.27
c1	2.54
X	1.00
X1	5.73
Y	2.00
Y1	6.17
Y2	1.64
Y3	2.66