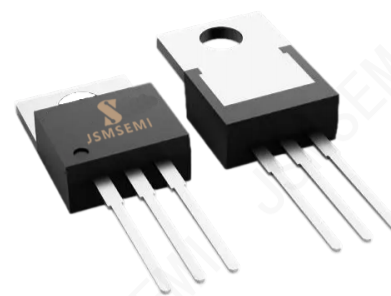


FEATURES

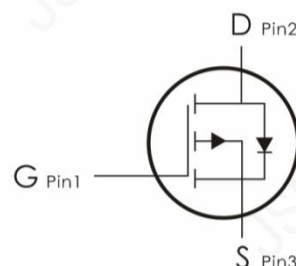
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



TO-220-3L



Device Marking and Package Information		
Device	Package	Marking
IRF9640PBF	TO-220-3	IRF9640

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted			
Parameter	Symbol	Value	Unit
		TO-220	
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	-200	V
Continuous Drain Current	I_D	-15	A
Pulsed Drain Current (note1)	I_{DM}	-60	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	165	mJ
Avalanche Current (note1)	I_{AS}	-11	A
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	78	mJ
Linear Derating Factor		0.6	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
		TO-220	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.6	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	

Specifications $T_J = 25^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	-200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = -200\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^{\circ}\text{C}$	--	--	5	μA
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 20\text{V}$	--	--	± 120	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = -250\mu\text{A}$	-2	--	-4	V
Drain-Source On-Resistance (Note3)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10\text{V}, I_{\text{D}} = -6.6\text{A}$	--	0.34	0.42	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V},$ $V_{\text{DS}} = -25\text{V},$ $f = 1.0\text{MHz}$	--	1200	---	pF
Output Capacitance	C_{oss}		--	370	--	
Reverse Transfer Capacitance	C_{rss}		--	81	--	
Total Gate Charge	Q_{g}	$V_{\text{DD}} = -100\text{V},$ $I_{\text{D}} = -13.5\text{A},$ $V_{\text{GS}} = -10\text{V}$	--	52	68	nC
Gate-Source Charge	Q_{gs}		--	9	--	
Gate-Drain Charge	Q_{gd}		--	25	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -160\text{V}, I_{\text{D}} = -13.5\text{A},$ $R_{\text{G}} = 25\ \Omega$	--	28	56	ns
Turn-on Rise Time	t_{r}		--	74	148	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	260	520	
Turn-off Fall Time	t_{f}		--	120	240	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_{S}	$T_{\text{C}} = 25^{\circ}\text{C}$	--	--	-15	A
Pulsed Diode Forward Current	I_{SM}		--	--	-60	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}\text{C}, I_{\text{SD}} = -11\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	-5	V
Reverse Recovery Time	t_{rr}	$V_{\text{GS}} = 0\text{V}, I_{\text{S}} = -11\text{A},$ $di_{\text{F}}/dt = 100\text{A}/\mu\text{s}$	--	250	300	ns
Reverse Recovery Charge	Q_{rr}		--	2.9	3.6	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = -11A, V_{DD} = 25V, R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

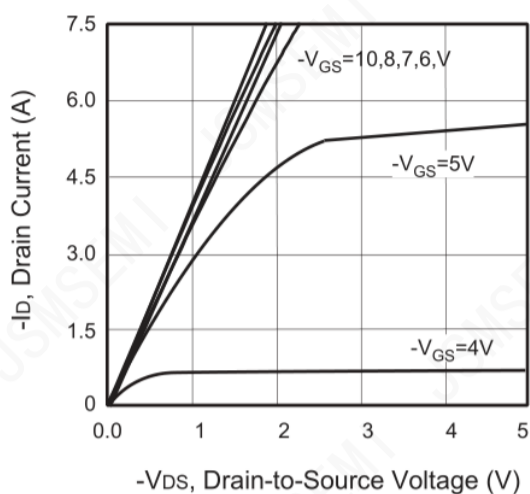


Figure 1. Output Characteristics

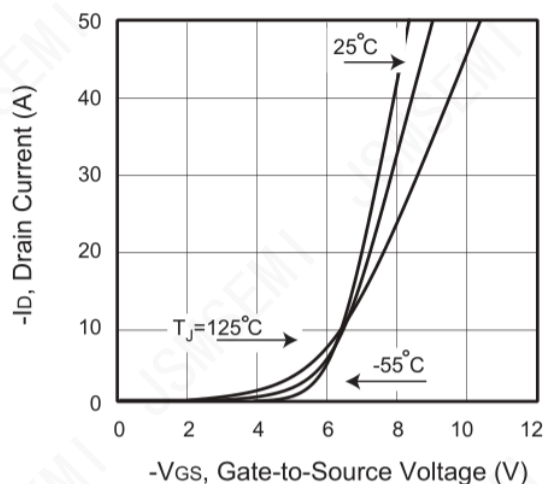


Figure 2. Transfer Characteristics

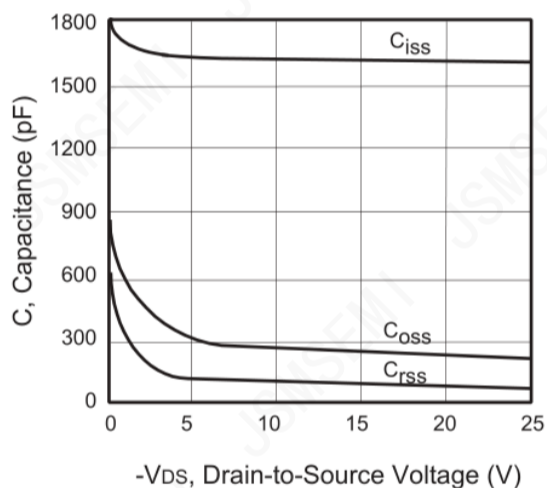


Figure 3. Capacitance

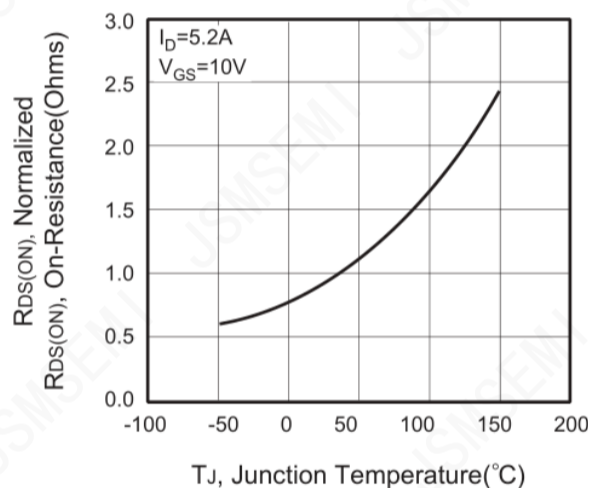


Figure 4. On-Resistance Variation with Temperature

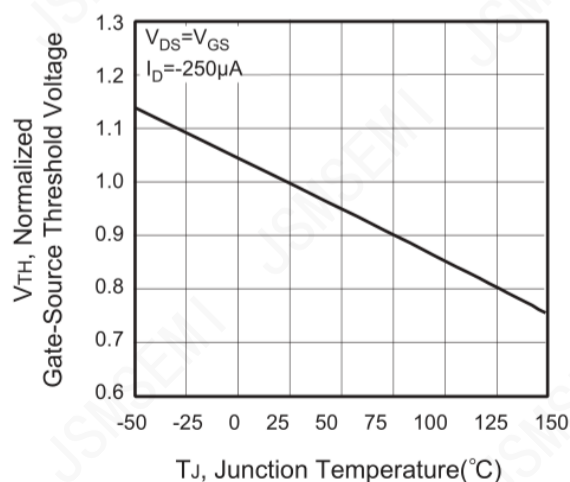


Figure 5. Gate Threshold Variation with Temperature

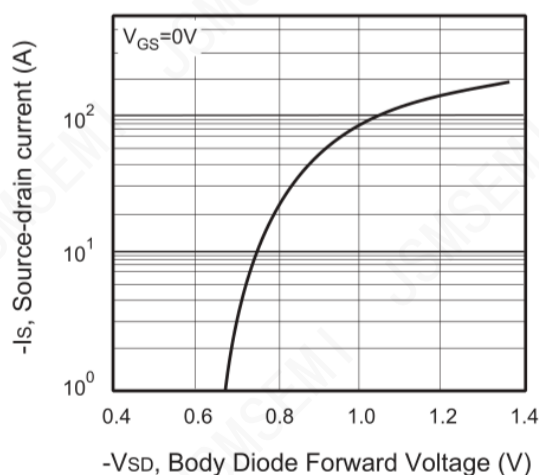


Figure 6. Body Diode Forward Voltage Variation with Source Current

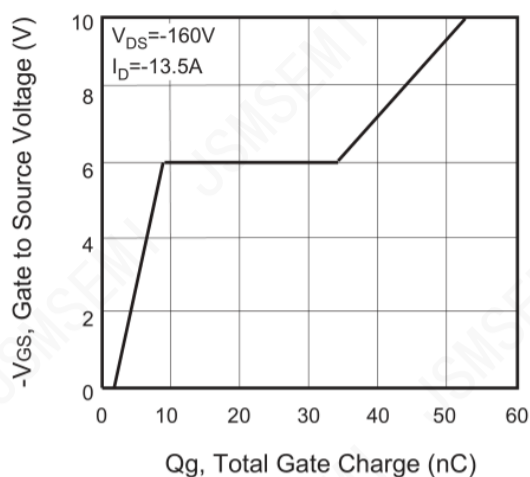


Figure 7. Gate Charge

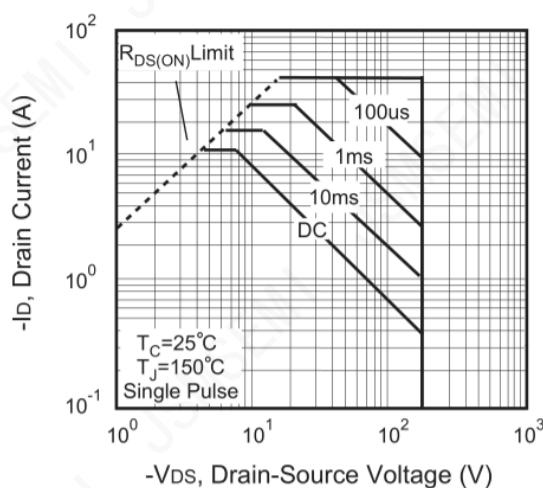


Figure 8. Maximum Safe Operating Area

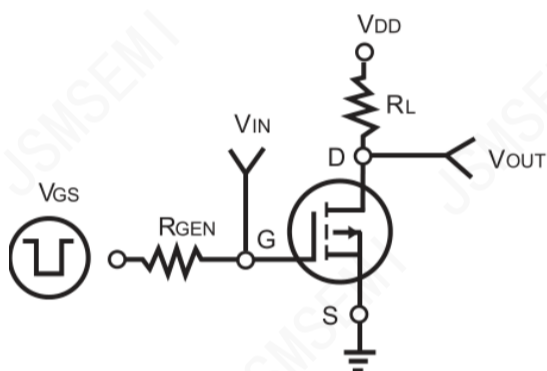


Figure 9. Switching Test Circuit

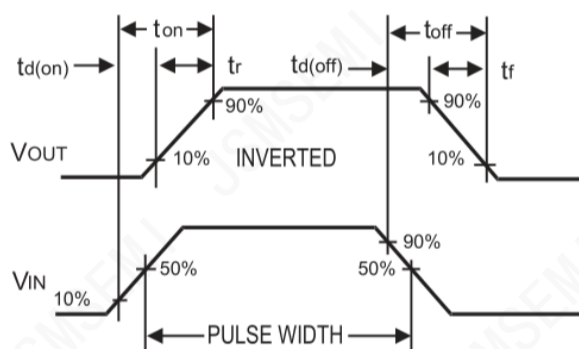


Figure 10. Switching Waveforms

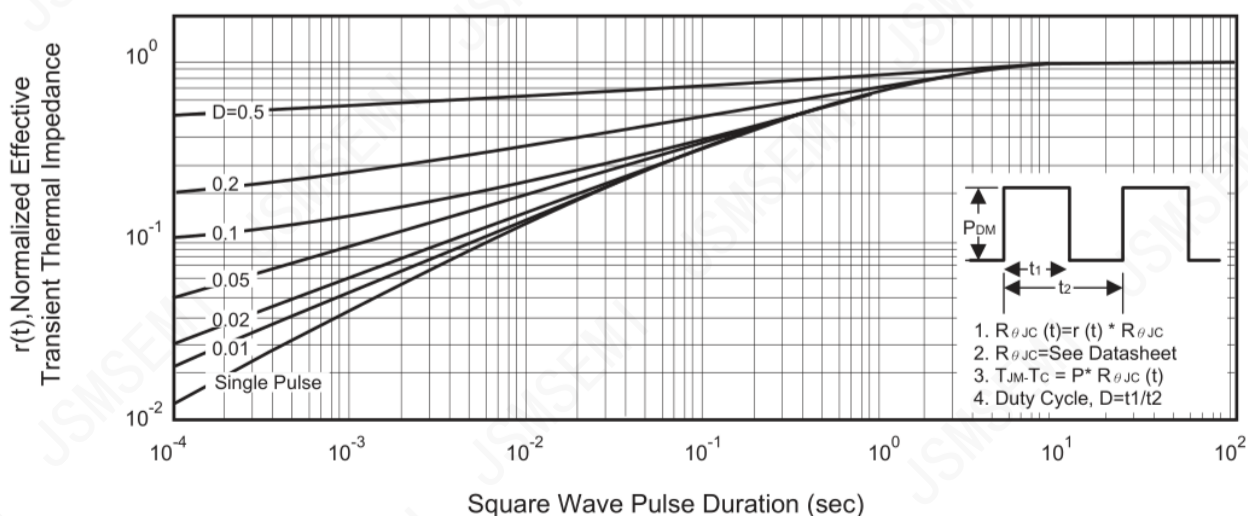
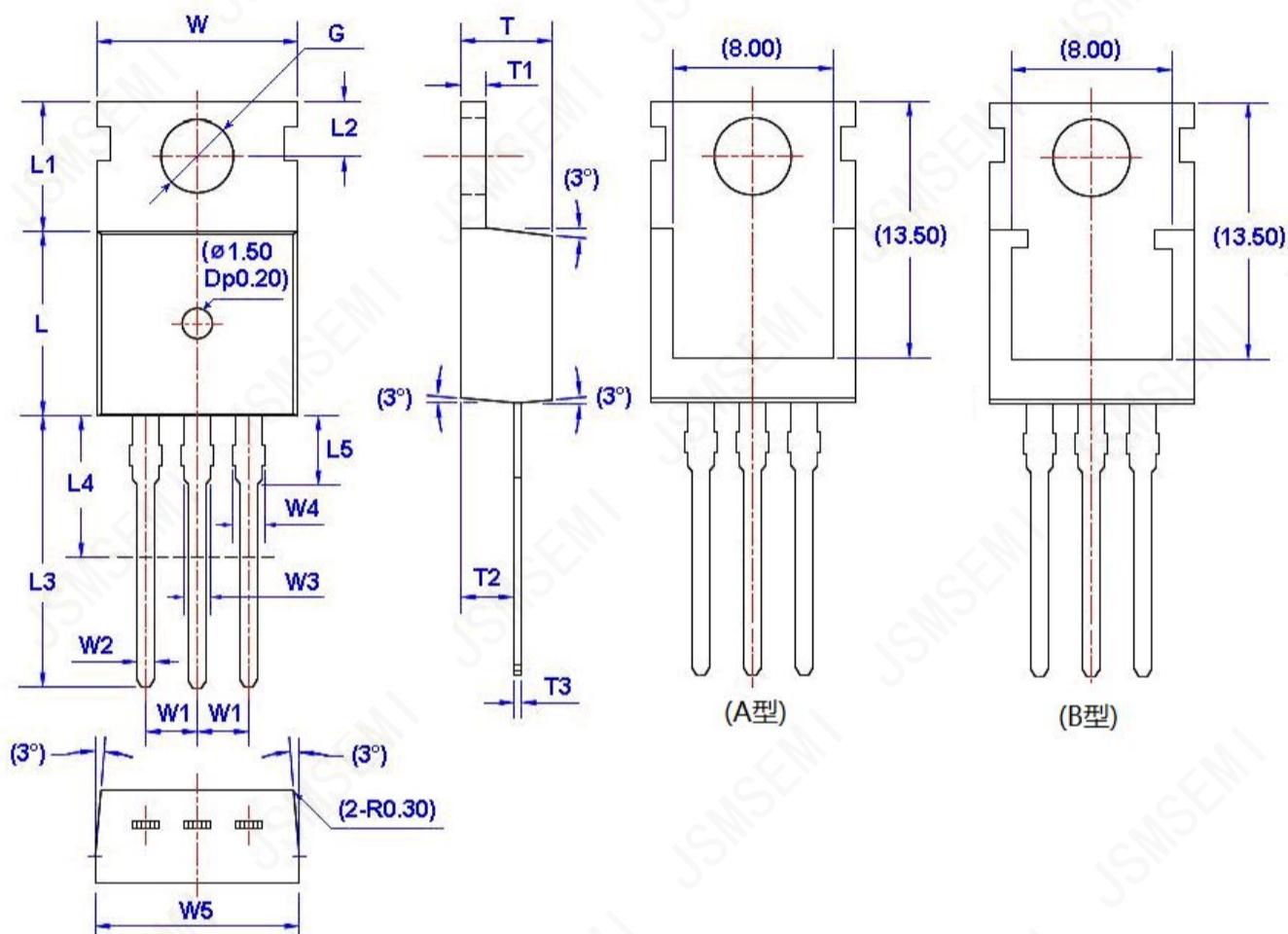


Figure 11. Normalized Thermal Transient Impedance Curve

Package Outline: TO-220



Unit: mm

Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			