

## IRLML0060TRPbF

$V_{DSS}$	60	V
$V_{GS}$	$\pm 16$	V
$R_{DS(on) \max}$ (@ $V_{GS} = 10V$ )	92	m $\Omega$
$R_{DS(on) \max}$ (@ $V_{GS} = 4.5V$ )	116	m $\Omega$

### FEATURES

- Low  $R_{DS(on)}$  ( $\leq 92m\Omega$ )
- Industry-standard pinout
- Compatible with existing Surface Mount Techniques
- RoHS compliant containing no lead, no bromide and no halogen
- MSL1, Industrial qualification

### Benefits

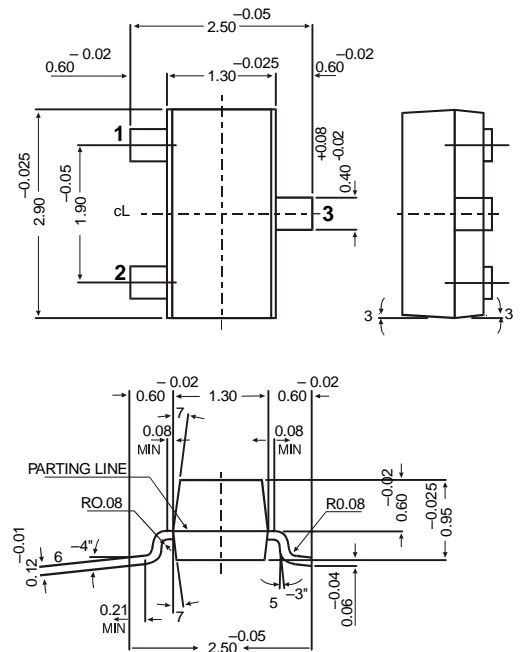
- Lower switching losses
- Multi-vendor compatibility
- Easier manufacturing
- Environmentally friendly
- Increased reliability

### Application(s)

- Load/ System Switch



**SOT-23 Formed SMD Package**



### Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	60	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.7	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.1	
$I_{DM}$	Pulsed Drain Current	11	W
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation	1.25	
$P_D @ T_A = 70^\circ C$	Maximum Power Dissipation	0.80	
	Linear Derating Factor	0.01	mW/ $^\circ C$
$V_{GS}$	Gate-to-Source Voltage	$\pm 16$	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 150	$^\circ C$

### Thermal Resistance

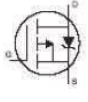
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient <sup>③</sup>	—	100	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient (t < 10s)	—	99	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.06	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	98	116	m $\Omega$	$V_{GS} = 4.5V, I_D = 2.2A$
		—	78	92		$V_{GS} = 10V, I_D = 2.7A$
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.5	V	$V_{DS} = V_{GS}, I_D = 25\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	20	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 60V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -16V$
$R_G$	Internal Gate Resistance	—	1.6	—	$\Omega$	
gfs	Forward Trans conductance	7.6	—	—	S	$V_{DS} = 25V, I_D = 2.7A$
$Q_g$	Total Gate Charge	—	2.5	—	nC	$I_D = 2.7A$
$Q_{gs}$	Gate-to-Source Charge	—	0.7	—		$V_{DS} = 30V$
$Q_{gd}$	Gate-to-Drain ('Miller') Charge	—	1.3	—		$V_{GS} = 4.5V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	5.4	—	ns	$V_{DD} = 30V$ ②
$t_r$	Rise Time	—	6.3	—		$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	6.8	—		$R_G = 6.8\Omega$
$t_f$	Fall Time	—	4.2	—		$V_{GS} = 4.5V$
$C_{iss}$	Input Capacitance	—	290	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	37	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	21	—		$f = 1.0\text{MHz}$

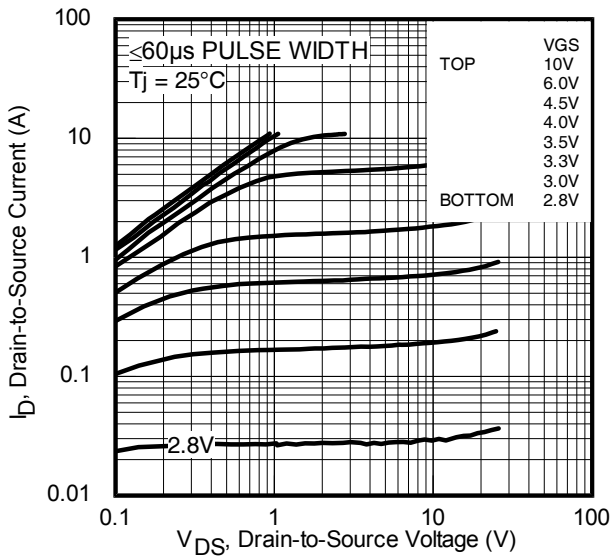
### Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	1.6	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	11		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 2.7A, V_{GS} = 0V$ ②
$t_{rr}$	Reverse Recovery Time	—	14	21	ns	$T_J = 25^\circ\text{C}, V_R = 30V, I_F = 1.6A$
$Q_{rr}$	Reverse Recovery Charge	—	13	20	nC	$di/dt = 100A/\mu s$ ②

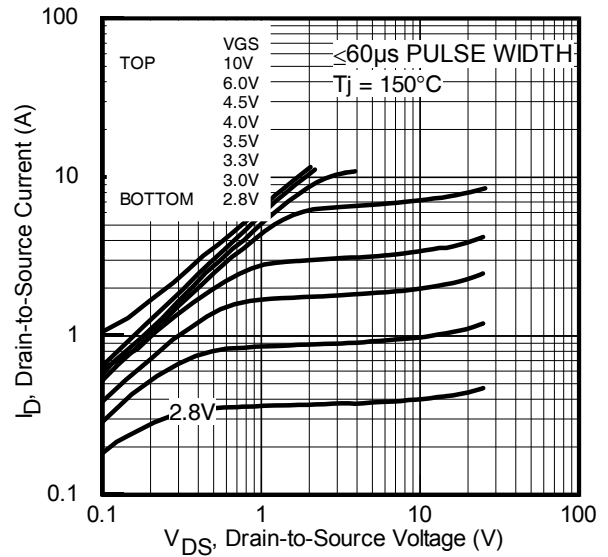
#### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ③ Surface mounted on 1 in square Cu board

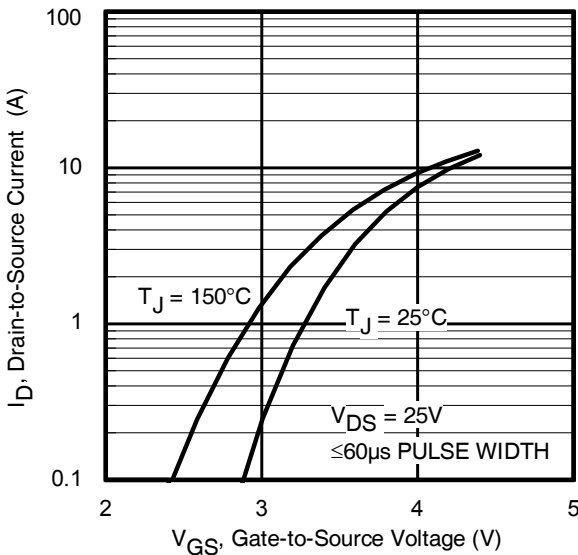
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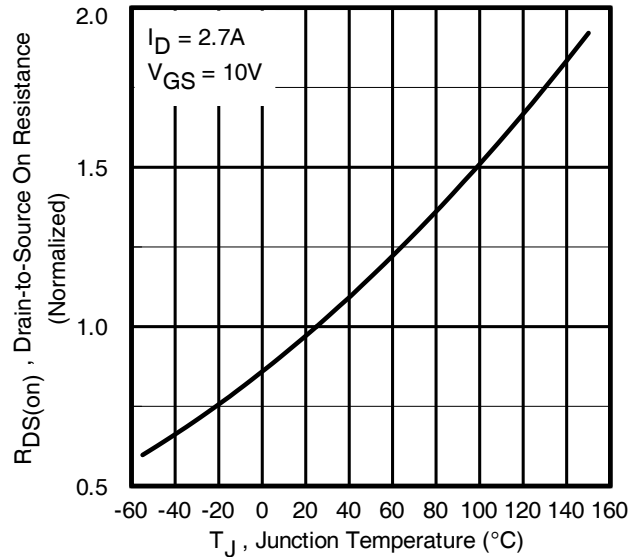
**Fig. 1** Typical Output Characteristics



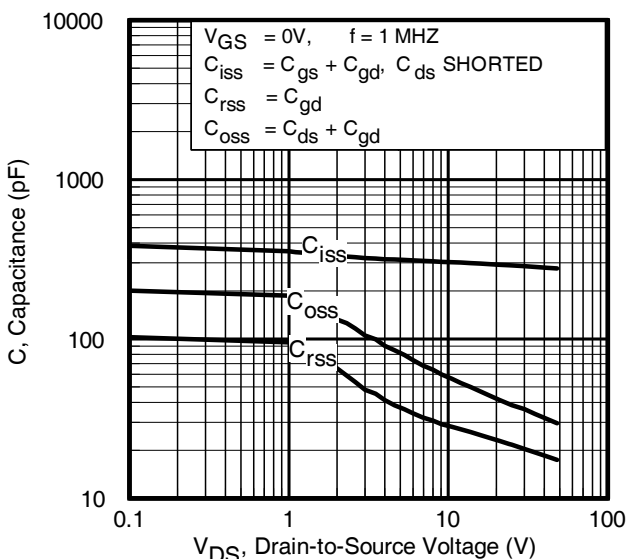
**Fig. 2** Typical Output Characteristics



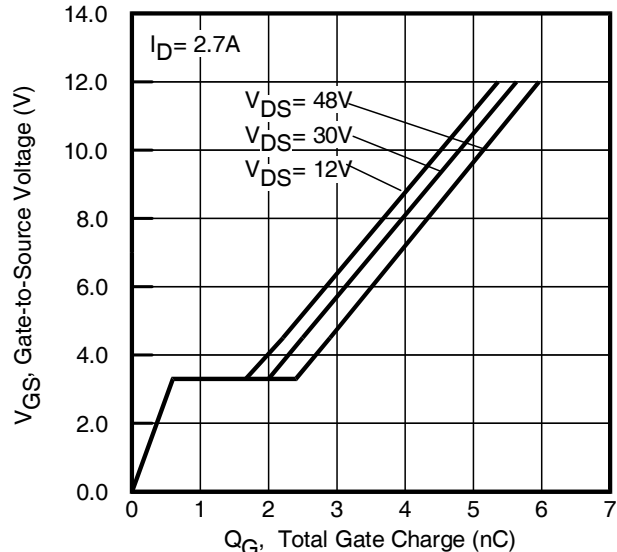
**Fig. 3** Typical Transfer Characteristics



**Fig. 4** Normalized On-Resistance vs. Temperature

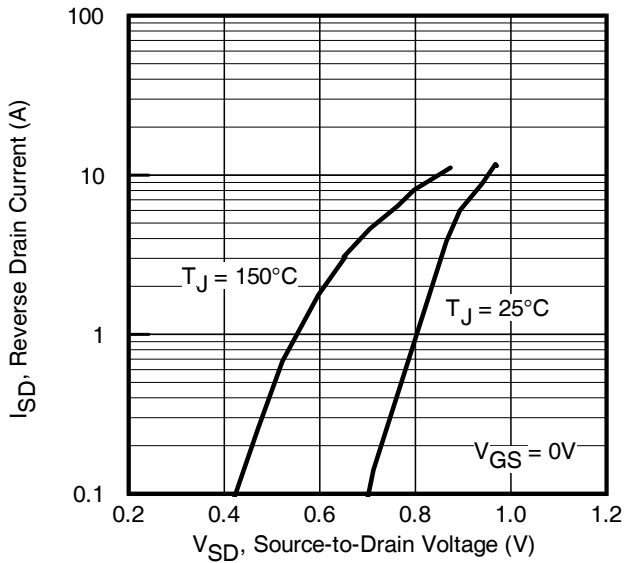


**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

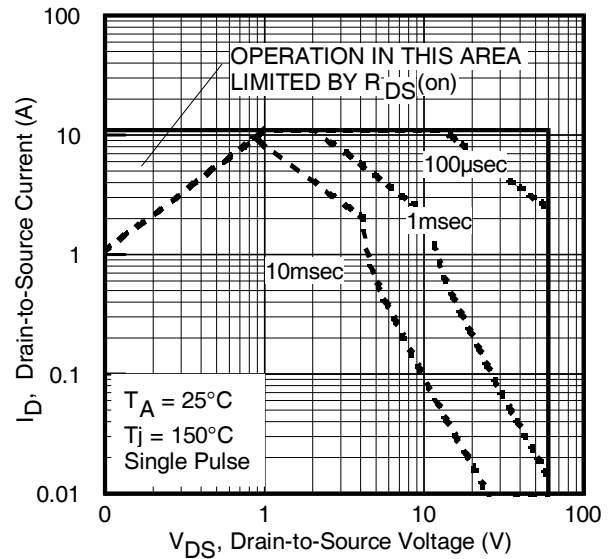


**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

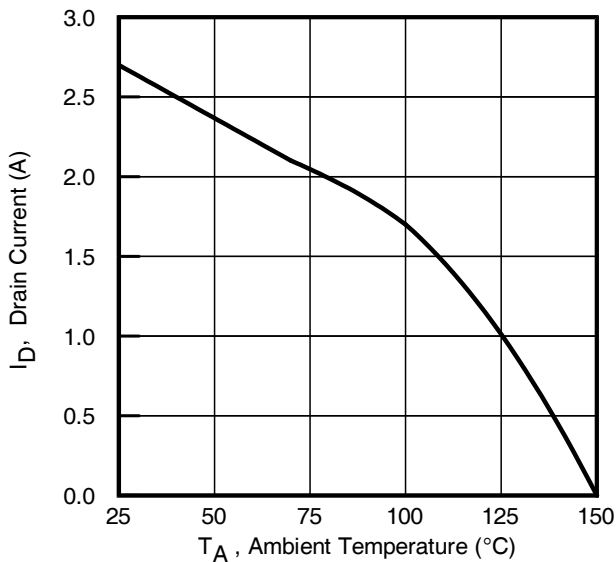
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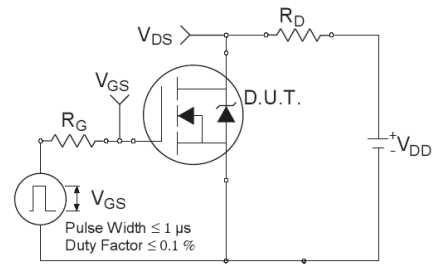
**Fig. 7** Typical Source-to-Drain Diode Forward Voltage



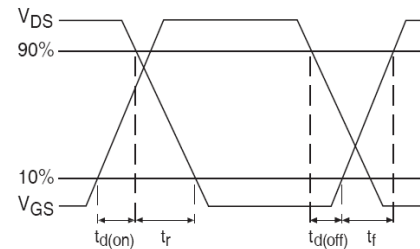
**Fig 8.** Maximum Safe Operating Area



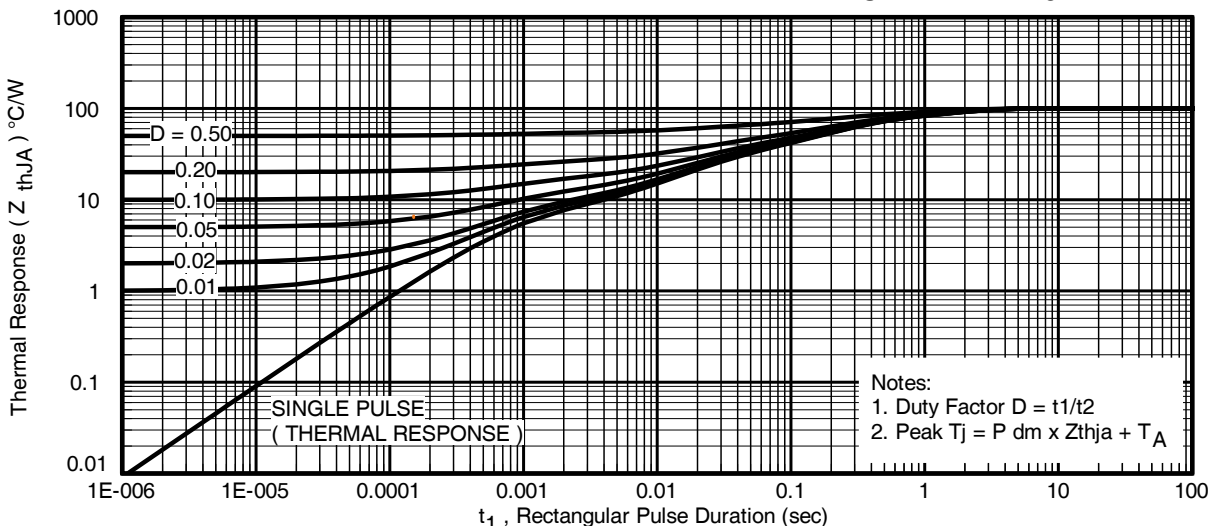
**Fig 9.** Maximum Drain Current vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit

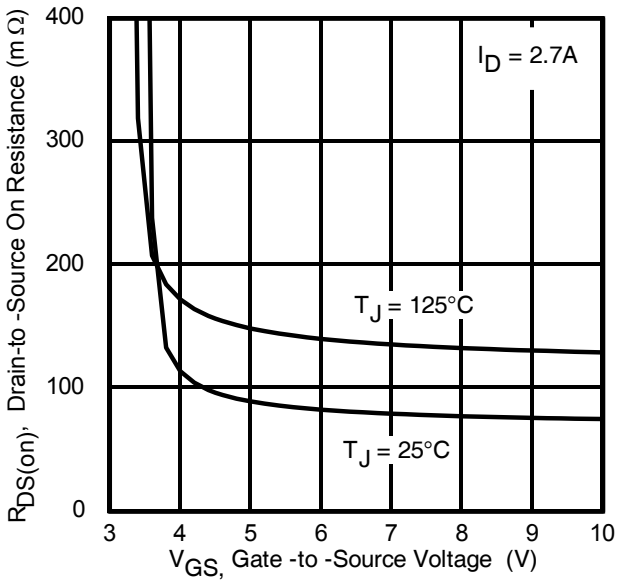


**Fig 10b.** Switching Time Waveforms

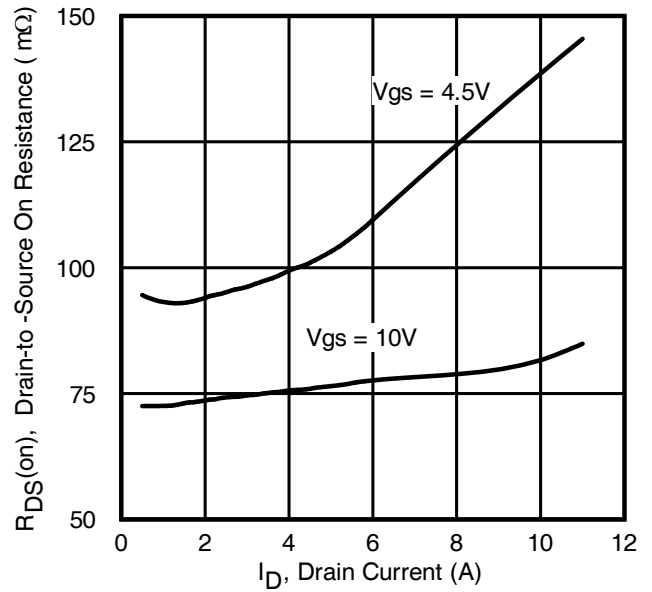


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

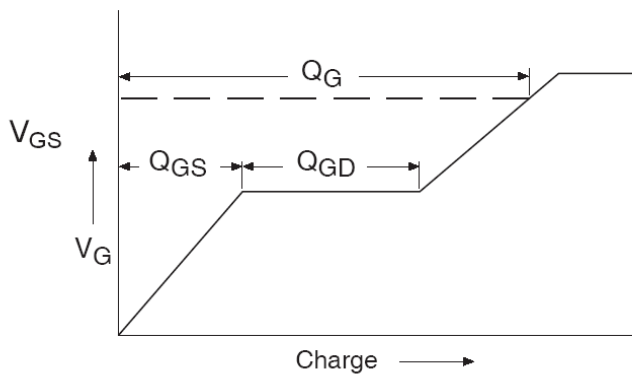
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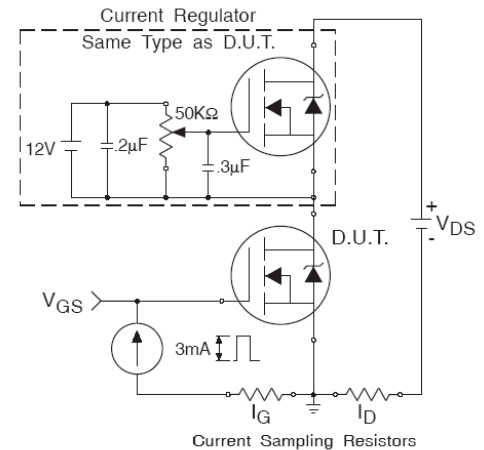
**Fig 12.** Typical On-Resistance Vs. Gate Voltage



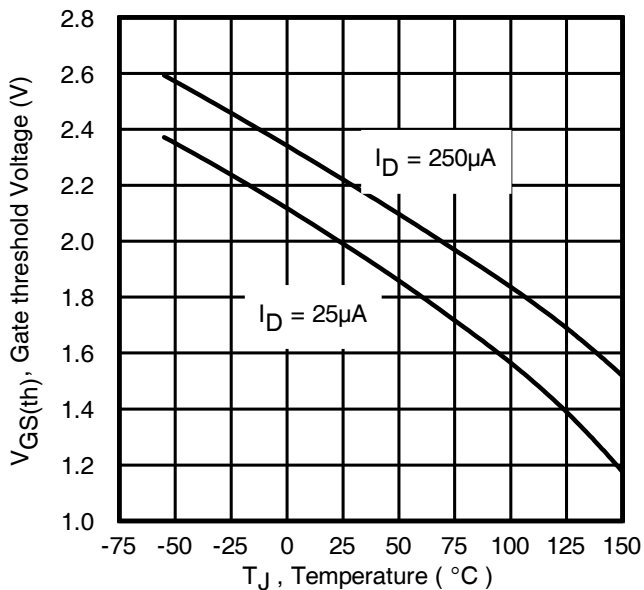
**Fig 13.** Typical On-Resistance Vs. Drain Current



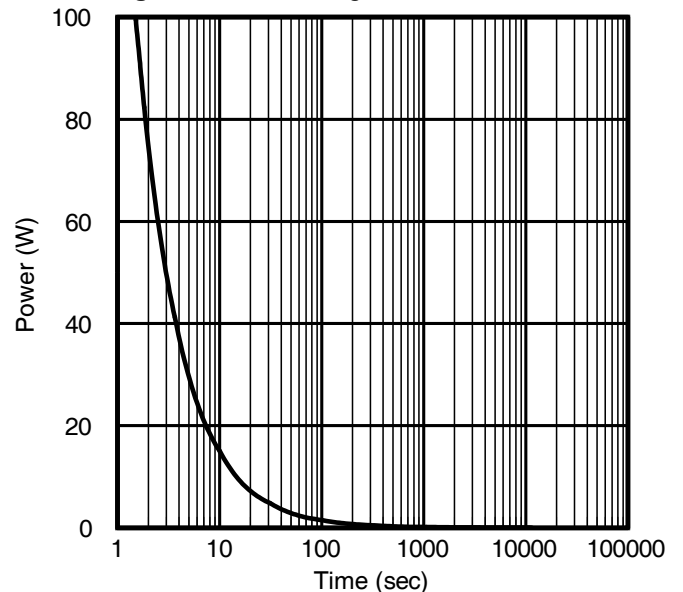
**Fig 14a.** Basic Gate Charge Waveform



**Fig 14b.** Gate Charge Test Circuit



**Fig 15.** Typical Threshold Voltage Vs. Junction Temperature



**Fig 16.** Typical Power Vs. Time