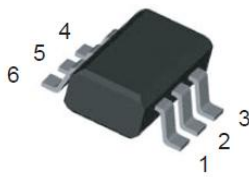


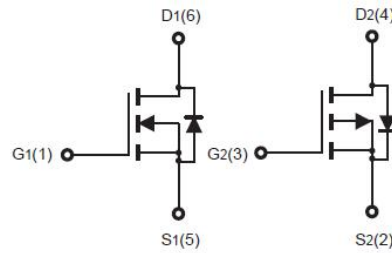
### Features

- Low On resistance.
- $\pm 4.5V$  drive.
- RoHS compliant.

### Package Dimensions



TSOP-6



### Specifications

#### Absolute Maximum Ratings at $T_a=25^{\circ}C$

Parameter	Symbol	Conditions	N-Channel	P-Channel	Unit
Drain-to-Source Voltage	$V_{DSS}$		20	-20	V
Gate-to-Source Voltage	$V_{GSS}$		$\pm 12$	$\pm 12$	V
Drain Current (DC)	$I_D$		3.5	-2.5	A
Drain Current (Pulse)	$I_{DP}$	$PW \leq 10\mu S$ , duty cycle $\leq 1\%$	14	10	A
Allowable Power Dissipation	$P_D$	Mounted on a ceramic board (1000mm <sup>2</sup> ×0.8mm) 1unit	1.14	1.14	W
Total Dissipation	$P_T$	Mounted on a ceramic board (1000mm <sup>2</sup> ×0.8mm)	1.14		W
Channel Temperature	$T_{ch}$		150		$^{\circ}C$
Storage Temperature	$T_{stg}$		-55~+15 0		$^{\circ}C$

#### N-Channel Electrical Characteristics at $T_a=25^{\circ}C$

Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=250\mu A$ , $V_{GS}=0V$	20	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V$ , $V_{GS}=0V$	-	-	1	$\mu A$

Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS}=12V, V_{DS}=0V$	-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4		1.2	V
Static Drain-to-Source On-State Resistance	$R_{DS(ON)}$	$I_D=2.5A, V_{GS}=4.5V$	-	28	35	m $\Omega$
	$R_{DS(ON)}$	$I_D=2A, V_{GS}=2.5V$	-	36	60	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, f=1MHz$	-	380	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=10V, V_{GS}=0V, f=1MHz$	-	90	-	pF
Reverse Transfer Capacitance	$C_{rss}$	$V_{DS}=10V, V_{GS}=0V, f=1MHz$	-	60	-	pF

**N-Channel Electrical Characteristics at  $T_a=25^\circ C$  (Continued)**

Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	max	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=10V, R_{GEN}=6\Omega, I_D=3.5A, V_{GS}=4.5V$	-	16		nS
Rise Time	$t_r$		-	16		nS
Turn-off Delay Time	$t_{d(off)}$		-	32		nS
Fall Time	$t_f$		-	7		nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=3.3V, I_D=3.5A$	-	3.6		nC
Gate-to-Source Charge	$Q_{gs}$		-	1.0	-	nC
Gate-to-Drain "Miller" Charge	$Q_{gd}$		-	1.2	-	nC
Diode Forward Voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$	-		1.1	V

**P-Channel Electrical Characteristics at  $T_a=25^\circ C$** 

Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=-250\mu A, V_{GS}=0V$	-20	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-16V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS}=-12V, V_{DS}=0V$	-	-	-100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4		-1.2	V
Static Drain-to-Source On-State Resistance	$R_{DS(ON)}$	$I_D=-2.5A, V_{GS}=-4.5V$	-	60	85	m $\Omega$
	$R_{DS(ON)}$	$I_D=-1.5A, V_{GS}=-2.5V$	-	90	115	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	-	375	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	-	90	-	pF
Reverse Transfer Capacitance	$C_{rss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	-	60	-	pF

**P-Channel Electrical Characteristics at  $T_a=25^\circ C$  (Continued)**

Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	max	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=-10V, R_{GEN}=3\Omega, I_D=-2.5A, V_{GS}=-4.5V$	-	17		nS
Rise Time	$t_r$		-	17		nS
Turn-off Delay Time	$t_{d(off)}$		-	27		nS
Fall Time	$t_f$		-	7		nS
Total Gate Charge	$Q_g$	$V_{DS}=-10V, V_{GS}=-3.3V, I_D=-2.0A$	-	2.9		nC
Gate-to-Source Charge	$Q_{gs}$		-	0.46	-	nC

Gate-to-Drain "Miller" Charge	$Q_{gd}$		-	1.2	-	nC
Diode Forward Voltage	$V_{SD}$	$I_S = -1A, V_{GS} = 0V$	-		1.1	V

Typical Characteristics at  $T_a = 25^\circ C$

N-CHANNEL

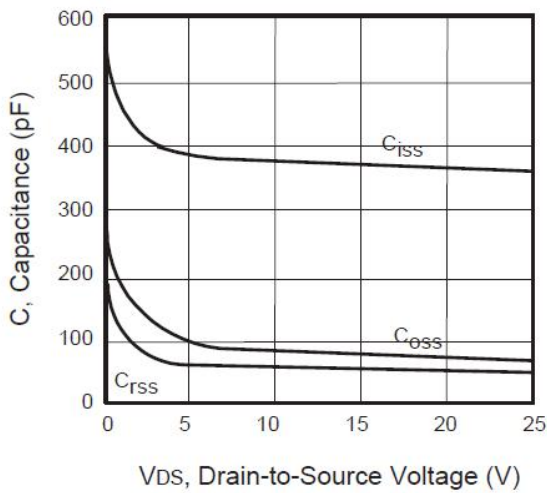
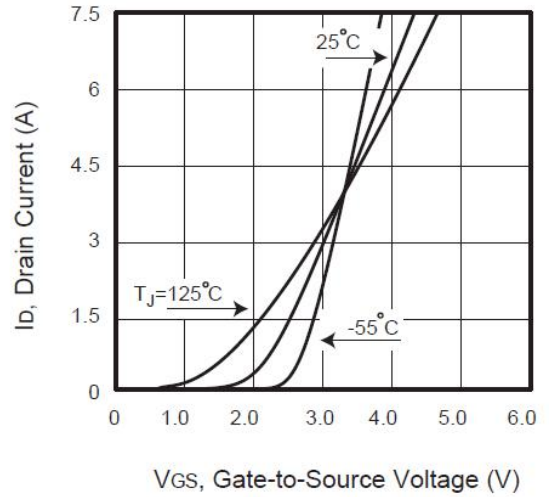
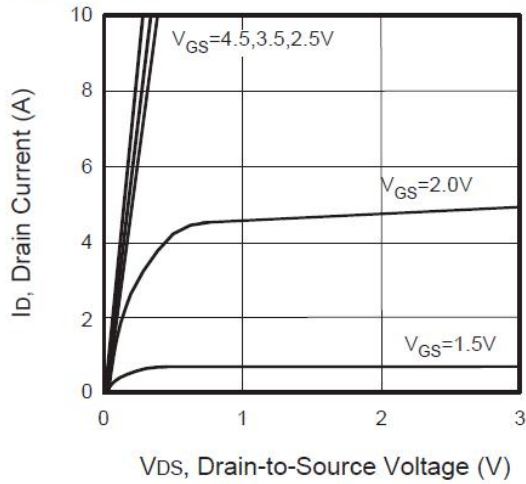


Figure 3. Capacitance

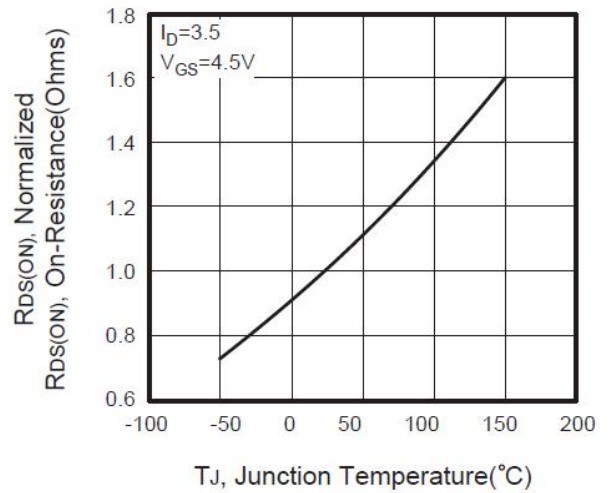


Figure 4. On-Resistance Variation with Temperature

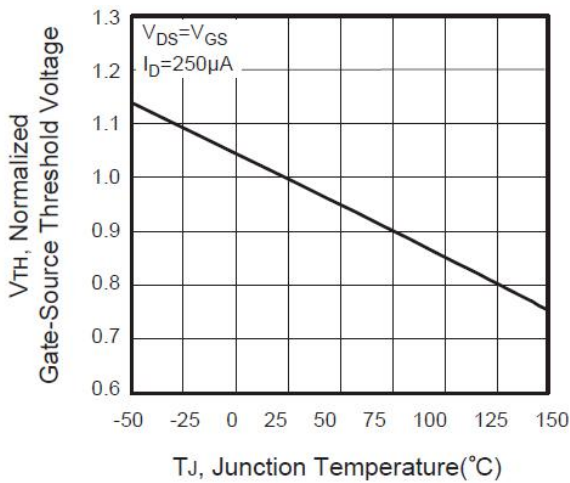


Figure 5. Gate Threshold Variation with Temperature

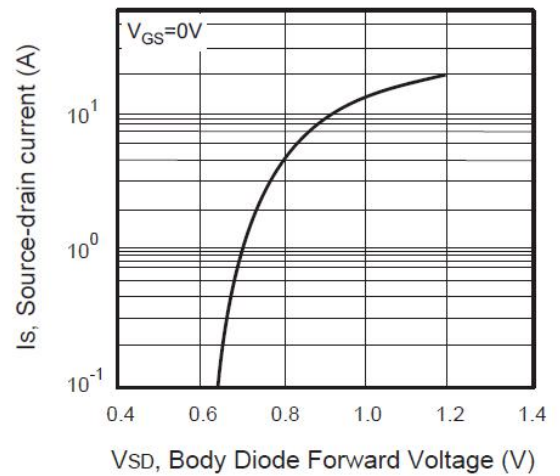


Figure 6. Body Diode Forward Voltage Variation with Source Current

**P-CHANNEL**

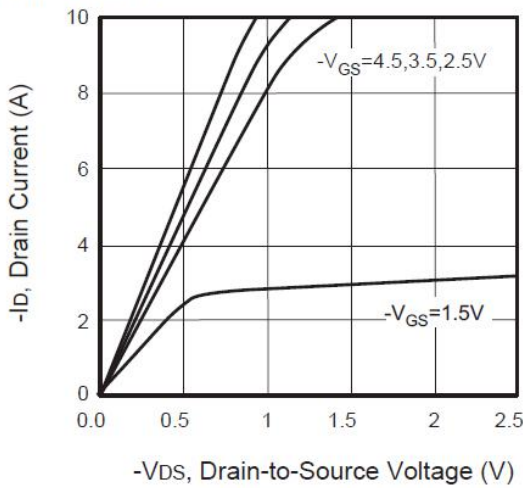


Figure 1. Output Characteristics

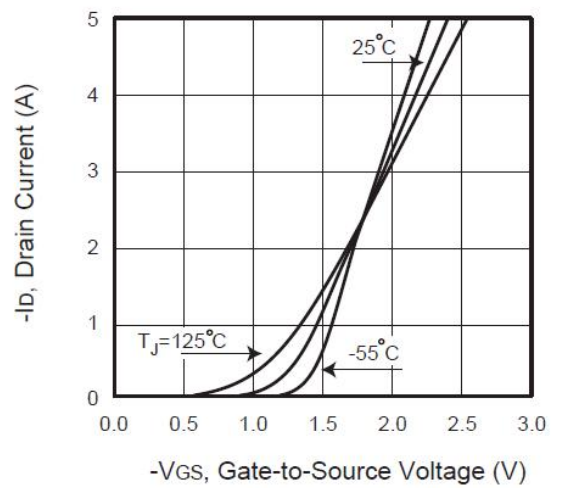


Figure 2. Transfer Characteristics

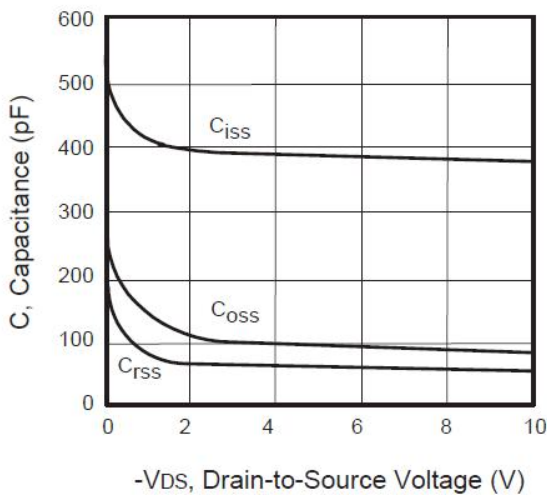


Figure 3. Capacitance

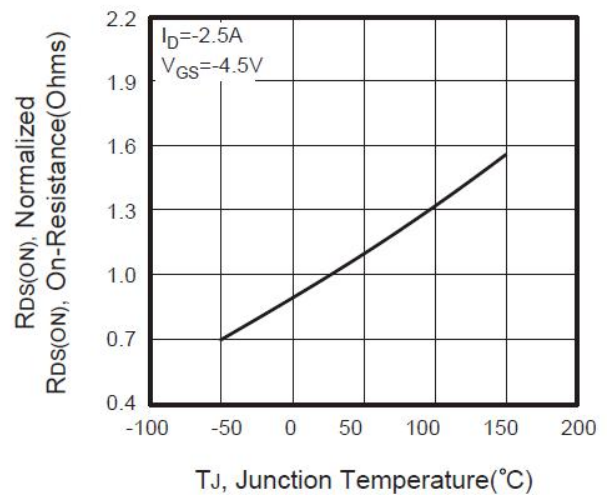


Figure 4. On-Resistance Variation with Temperature

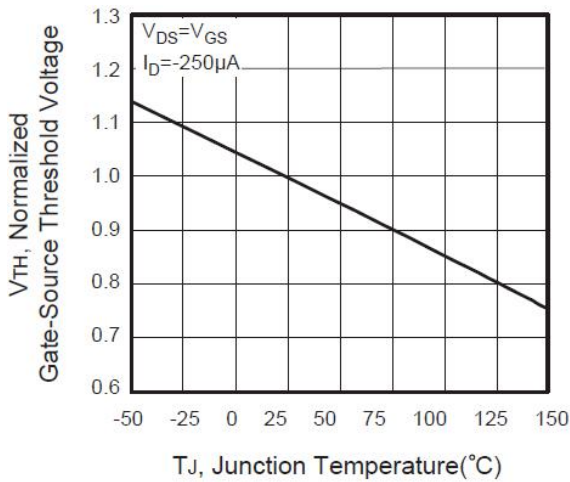


Figure 5. Gate Threshold Variation with Temperature

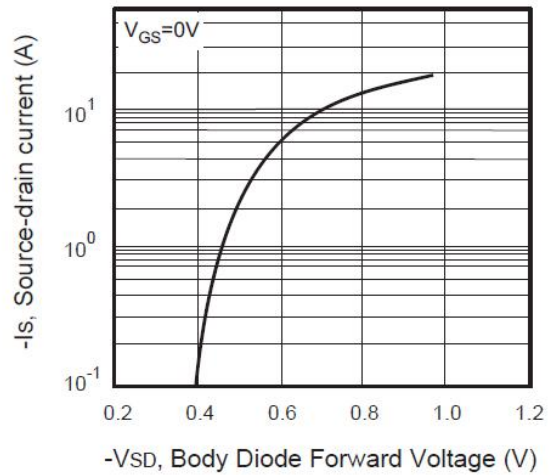


Figure 6. Body Diode Forward Voltage Variation with Source Current

**N-CHANNEL**

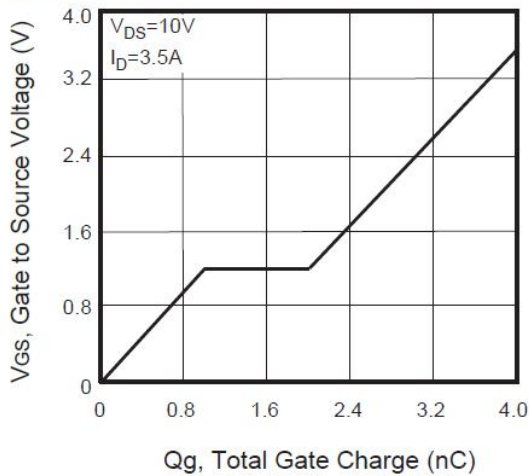


Figure 13. Gate Charge

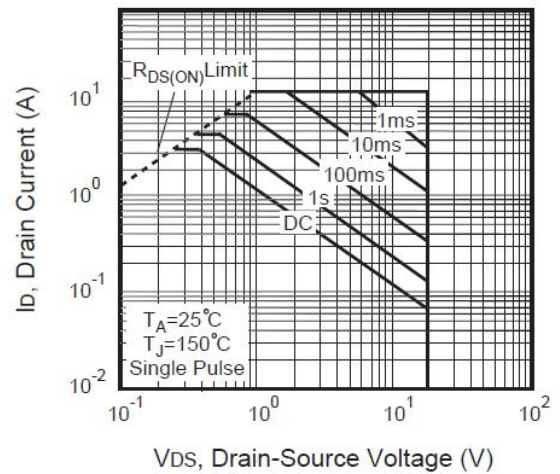


Figure 14. Maximum Safe Operating Area

**P-CHANNEL**

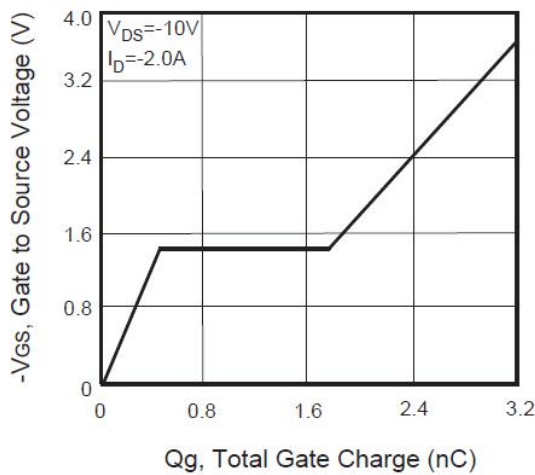


Figure 15. Gate Charge

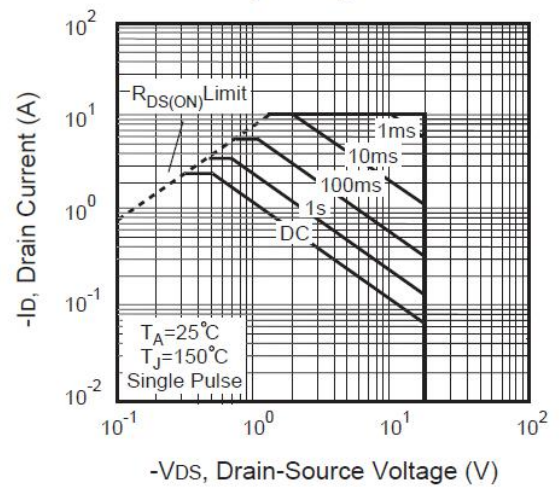


Figure 16. Maximum Safe Operating Area



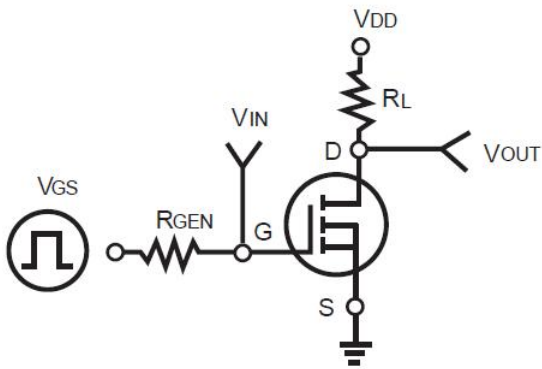


Figure 17. Switching Test Circuit

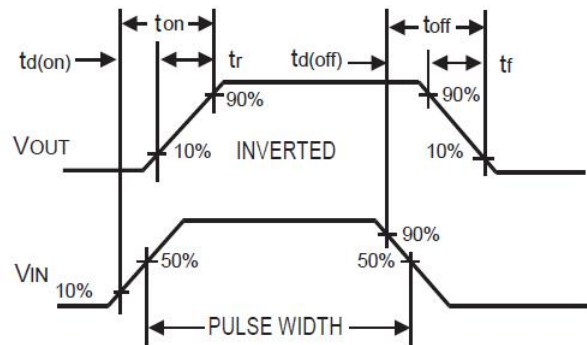


Figure 18. Switching Waveforms

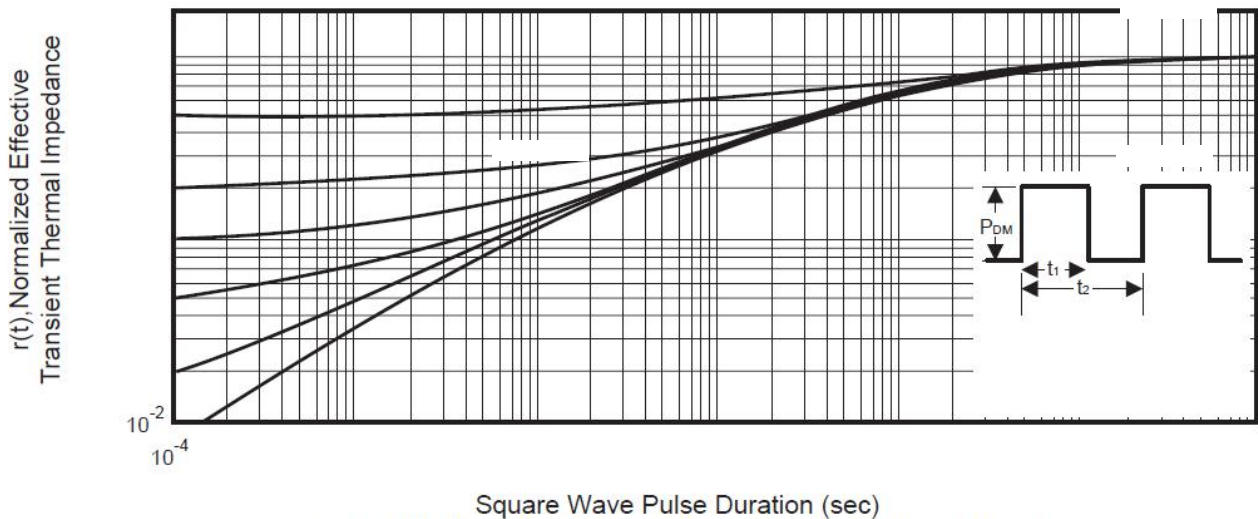


Figure 19. Normalized Thermal Transient Impedance Curve